The Chemical Age

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Budget and National Revenue

BUSINESS men will be well advised to guard against absorption in the details of the Budget, and to concentrate on the bigger task of getting the public to realise the seriousness of the situation as a whole. It is almost staggering that after ten years of peace the annual bill for the Government should total £800,000,000, a figure which takes no account of local burdens. The public purse, national and local, is receiving out of industry—for all the money comes, of course, in the end from industry—the enormous sum of £1,000,000,000 a year, or roughly £3 per week per family. Politicians will be busy in the next few weeks in meticulous argument to prove that there is, or is not, a surplus of three or four millions, and it is very important that public attention should not be diverted to so trumpery a detail, when all the time the life-blood of the nation is streaming away in the bigger total.

Mr. Churchill's fictitious surplus is arrived at by methods which no accountant would pass if applied to an ordinary business undertaking. The current year's accounts, to begin with, include 18 months of Schedule A, and 13 months of beer money. No business man would dare make up an annual account on this basis; but there are even worse offences. It has been, ever since the war, the practice of Chancellors to sell assets in the way of surplus stores and other property which came into their possession for war purposes, and to treat the sale which belongs to the capital account as if it were revenue. A still less defensible practice is that of borrowing huge sums from the public in the form of War Saving Certificates and National Saving Certificates, and entering them upon the books of the Treasury at the original figures without regard to interest that has accrued in the meantime.

All these details, important as they are and helpful as they are in the study of the problem as a whole, must be kept in the background when the discussion must sooner or later be brought back to the main question—the size of the Budget as a whole. We are not in the least concerned with party politics, but it is permissible to suggest that a Conservative policy is nominally associated with economy. If a Conservative Government is to be permitted to spend £800,000,000, how much will be considered adequate by a Liberal Government, with elaborate new schemes for Government departments, and how much more still will be needed by a Socialist Government, with even larger ideas in the same direction. The prospect is truly alarming, and the business classes have a duty to the nation, somehow or other to make it understand that if large slices of this total can be got back into industry, prosperous times will return. If, on the other hand, these political deprivations are to continue on this scale the hope of prosperity may almost be abandoned.

Public Chemical Appointments

A POINT of some interest has been raised recently in connection with the advertisement, a short time ago, by the City Council of Leeds, of the terms and conditions under which they wished to appoint a city analyst. At the time, the council of the Institute of Chemistry made certain representations to the Leeds City Council with respect to the terms of the appointment. It now appears that suggestions have been made that the Leeds Corporation had reason to complain of the publicity given to the matter before its appropriate committee had had an opportunity of considering the representations.

The reply to this is, in the first instance, that the Institute is by no means the first professional body to express publicly its opinion regarding the terms and conditions offered in public appointments. Moreover, some professional bodies have gone far beyond a mere expression of opinion, and have advised their members not to apply for certain appointments until the terms offered were improved. In regard to the appointment of, for example, medical officers of health, this situation

has arisen on more than one occasion, and has been given all possible publicity both by the lay and the professional Press. The council of the Institute of Chemistry has every reason to repudiate the view that it acted in any way incorrectly in regard to the Leeds appointment, and in its action in this and all similar cases it will have the solid support of the whole chemical profession. Communications made by the council of the Institute on these occasions are invariably a model of their kind : they are always couched in the most dignified and moderate terms, and no attempt is ever made to exaggerate or distort a single fact. As an example, reference may be made to the memorandum prepared and forwarded to the Royal Commission on Local Government some little time ago. This memorandum, drawn up by the councils of the Institute of Chemistry and the Society of Public Analysts, is now reprinted in the *Journal* of the Institute. It is to be hoped that it will be brought to the notice of as many public bodies as possible, in order that they may be brought to a proper sense of their responsibilities in the matter.

The United States Quinine Inquiry

A GOOD deal of interest attaches to the inquiry commenced by the Government of the United States into an alleged plan on the part of United States manufacturers and importers to control the price of quinine in violation of the Sherman Anti-Trust Act of 1890, following very quickly on the seizure in New York of quinine to the value of £20,000. The subpœnas for such an inquiry were, however, served as long ago as last November. It is not, perhaps, without significance that the Amsterdam Cinchona Agreement is due for revision this year, and possibly those responsible for the inquiry have in view a lower price for the consumer. The Cinchona Agreement fixes the price of cinchona bark and distributes the total profits made, according to a definite ratio, between the manufacturers and the growers. Of the strength of the Agreement, it is sufficient to say that the island of Java carries 95 per cent. of the crops of cinchona bark coming on the markets of the world, and that, as matters stand at present, with the exception of the limited production of the plantations controlled by British capital and having an agreement with Howards and Sons, Ltd., of Ilford, the whole of the Java production passes through the Kina Bureau at Amsterdam, and thence to the various countries of the world, all of which are parties to the Cinchona Agreement. Competent observers seem to doubt whether the United States inquiry will materially affect the situation.

According to the managing director of the Kina Bureau, Herr C. M. P. d'Ailly, who recently made a report on the subject to the League of Nations Health Committee, the present price of quinine, having regard to the conditions of the Cinchona Agreement, is the lowest that will yield an adequate return to the grower. He holds the view that if the Agreement could be revised in favour of the growers, then the price might be reduced. The growers and manufacturers at present share the profits in the ratio of 3 : 2, and Herr d'Ailly suggests that if this ratio could be altered to 5 : 2, there would be an immediate benefit to the grower, prices could be brought down, and the expansion in consumption which could reasonably then be expected would enable the manufacturers to make up for the fall in their share of the profits by increased gross sale. Whether anything will come of this and other suggested methods of reducing the price of quinine remains to be seen.

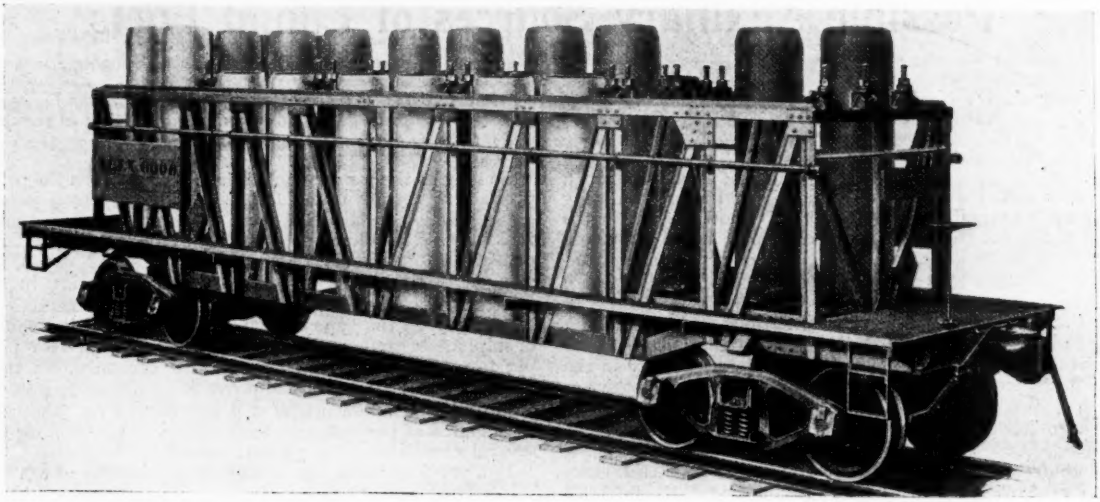
Books Received

THE SIXTH SENSE AND OTHER STUDIES IN MODERN SCIENCE. By D. F. Fraser-Harris. London : George Routledge and Sons, Ltd. Pp. 174. 5s.

THE CHEMICAL EFFECTS OF ALPHA PARTICLES AND ELECTRONS. By Samuel C. Lind. New York : Chemical Catalog Co., Inc. Pp. 242. $5.00.

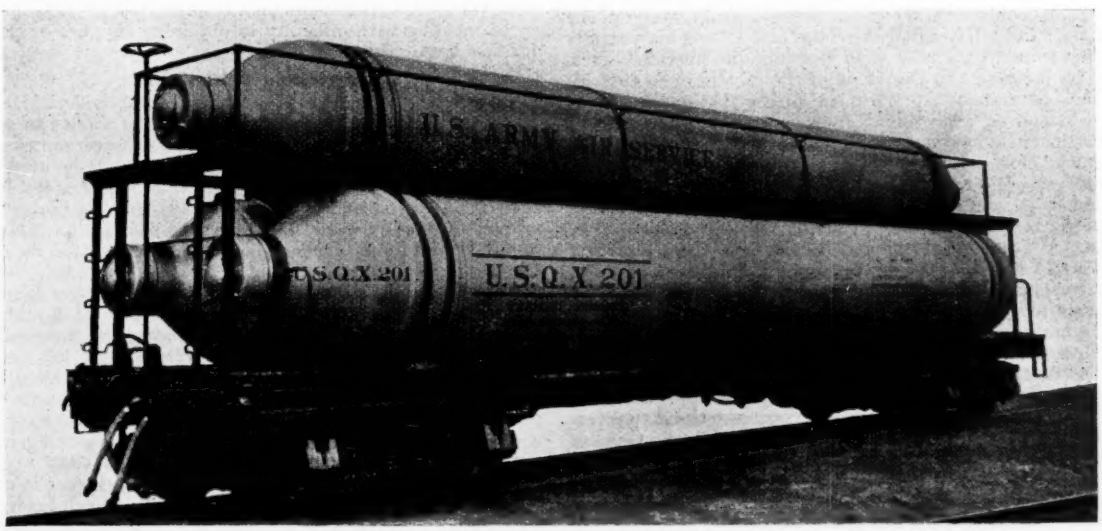
The Calendar

April 16	Ceramic Society : 7.30 p.m.	North Staffordshire Technical College, Stoke-on-Trent.
17	Institution of Petroleum Technologists. "Tube Still Distillation." C. H. S. Edmonds. 8.30 p.m.	John Street, Adelphi, London.
17	Royal Photographic Society. Scientific and Technical Group. 7 p.m.	35, Russell Square, London.
18	Oil and Colour Chemists' Association. Tenth Annual Dinner. 7 p.m.	Hotel Cecil, London.
18	Research Association of British Paint, Colour and Varnish Manufacturers : "Cellulose Lacquers." R. A. Coolahan. 2.30 p.m.	Waldegrave Road, Teddington.
18	Institute of Metals (Swansea Section) : Annual General Meeting. 7 p.m.	Thomas' Cafe, High Street, Swansea.
18	Society of Glass Technology : Annual General Meeting.	Sheffield.
20	Chemical Engineering Group. Joint meeting with the Birmingham Section of the Society of Chemical Industry. "The Heat Treatment of Ferrous Metals." Dr. C. M. Walter.	University, Birmingham.
20	Society of Dyers and Colorists (Manchester) : Annual Meeting. "Some Observations on Cotton Dyeing and Printing." G. E. Holden. "A New Reagent for the Detection of Oxycellulose." W. F. A. Ermen.	36, George Street, Manchester.
21	Society of Dyers and Colorists (Scottish Section). Ramsay Memorial Dinner.	Grosvenor Restaurant, Glasgow.
May 2	Society of Public Analysts.	Burlington House.
2	Royal Society of Arts : "Standardisation of the Elements of Scientific Apparatus, with Special Reference to Teaching." William Taylor. 8 p.m.	John Street, Adelphi, London.
3	Chemical Society. 8 p.m.	Burlington House, London.
8	Institute of Metals : Annual May Lecture. "The Chemical Properties of Crystals." Professor Cecil H. Desch. 8 p.m.	Storey's Gate, London, S.W.1.
8	Institution of Petroleum Technologists. 5.30 p.m.	John Street, Adelphi, London.
10	The Optical Society : Ordinary Meeting. 7.30 p.m.	Imperial College, London.
10	Oil and Colour Chemists' Association : Annual General Meeting. "Nitrocellulose Lacquers." H. Hepworth.	30, Russell Square, London.
11	Physical Society. 5 p.m.	Imperial College, London.
11	Chemical Engineering Group. Annual General Meeting and Dinner. "Some Chemical Engineering Aspects of the Fine Chemical Industry." F. H. Carr.	London.
14	Society of Chemical Industry : "The Fuel Industries and the Work of the Chemical Engineer." Sir Arthur Duckham. "Water Purification." Sir Alexander Houston.	London.



Gas Transportation in the United States

On this page are shown three examples of American railway cars specially designed for the transportation of gases. The top picture illustrates a multi-unit car for carrying compressed gas tanks of varying sizes. The middle picture shows a Class IV car designed for the carriage of volatile liquids and chemicals. The lower picture shows the type of car in use by the War and Navy Departments for transporting helium gas. The illustrations are reproduced from *Chemical Markets*, New York.



Possible Auxiliary Sources of Liquid Fuels

A Review of the Situation as a Whole

Professor A. W. Nash recently read a paper having the above title before the Petroleum Section of the Second Empire Mining and Metallurgical Congress in Canada. The paper gives a very complete discussion of the subject, and in the space available it has only been possible to give brief references to the more important parts.

THE essential need of an internal source of liquid fuel to a belligerent nation was demonstrated beyond question during the Great War, and the motive which is now urging on the greater nations of the world to seek for some cheap substitute for petrol or other liquid fuel from their own resources is undoubtedly a desire to be independent of foreign supplies which might be curtailed or completely cut off, not by failure of natural sources, but by war-time conditions or due, possibly, to political pressure. The development of the Diesel engine both for stationary and marine purposes, and possibly in the future for light vehicles both on land and in the air, together with the increase in the development of power generally, will cause a greater demand for crude oil in the future.

Although this demand will be met, undoubtedly, by the petroleum industry as the occasion arises, it nevertheless gives cause for serious consideration to a country which depends practically entirely on supplies from overseas.

Power Alcohol

The amount of alcohol used to drive internal-combustion engines is small compared with gasoline, but varies considerably in different countries. Fermentation processes for this depend largely on the possibility of obtaining fermentable substances as by-products in other industries. An example is the production of alcohol from waste liquors from the treatment of wood by the sulphite process. Germany, Norway, and Sweden are countries in which this particular waste product is used. In Great Britain, however, a process of this kind appears to be impracticable owing to the lack of sufficient raw material.

A further source of alcohol is from the reduction of acetaldehyde formed by the catalytic combination of acetylene and water. This process is carried out by the Lonza Co., but has been abandoned in Great Britain on commercial grounds. The cost of calcium carbide is the important factor of the process.

The production of alcohol by the absorption of ethylene from coal gas and coke oven gas in sulphuric acid was at one time thought to be promising, but the reconcentration of the acid has been found to be a greater expense than the process could bear. A further development has been made recently —namely, the neutralising of the sulphuric acid with ammonia, thereby yielding ammonium sulphate and freeing the alcohol, which would appear more helpful.

Low-Temperature Carbonisation

Much attention has been given to the problem of low-temperature carbonisation, both in Great Britain and on the Continent; indeed, Germany has been carbonising her younger coals for some years now with considerable success. It is still in its infancy, and the value of the tar obtained thereby is at present unknown; fractionation by distillation is no guide whatsoever, excepting as a measure of volatility.

Statements have been made to the effect that it is impossible to "crack" low temperature tar successfully and so obtain an increased yield of motor spirit, but such views should be accepted with caution, as sufficient experimental evidence has not yet been forthcoming to enable a definite opinion to be expressed. Tars from different coals and from different methods of retorting vary to such a considerable extent, and our knowledge of this material being so slight, it would be dangerous to dogmatise on any such point. Coke formation would appear to be one great difficulty.

As already indicated, the yields of the various products may differ, as do the chemical and physical properties of the tars obtained, according to the coal used, the conditions under which the tars are prepared, and the type of retorting system employed, but true low-temperature carbonisation yields roughly about 14 cwt. of semi-coke, 14 to 20 gallons of water-free tar, and from 3,000 to 5,000 cubic feet of gas from one ton of coal. The tar would yield about one and a half or two gallons of light oils, while about one and a quarter gallons of light spirit can be extracted from the gas by scrubbing.

So long as the tar production is looked upon as the primary product in normal times, low-temperature carbonisation will never develop in this country; the production of smokeless fuel must be the chief object and the production of liquid fuel considered of secondary importance; in other words, a by-product. Further, it is very doubtful, excepting in a few isolated cases where higher temperatures are used and depending largely on the type of coal carbonised, whether the yield of sulphate of ammonia will ever reach more than a few pounds per ton, and in true low-temperature carbonisation the extraction of the ammonia will prove to be a definite loss. The value of low-temperature tar will also depend on its suitability as a source of pure chemical substances, a problem on which several chemists are at present working.

In a previous paper by the author and another, a statement was made to the effect that the tar from carbonised coal could never replace natural petroleum in normal times, because it was not only of poorer quality, but the variety of products for the purpose in mind was very limited—*e.g.*, lubricants, vaseline, asphalt, etc., were missing, and there was a very high percentage of low-quality pitch left as residuum; also that low-temperature tar, when subjected to ordinary distillation, yielded an oil consisting largely of unsaturated hydrocarbons, together with paraffins, naphthenes, and probably smaller quantities of aromatics, together with phenols, consisting of cresols, xylenols, and others of unknown constitution and nitrogenous bases.

Berginisation

The Bergius process has one great advantage over low-temperature carbonisation in that it converts coal in one stage into a tar. The treatment employed, which is now well known, consists essentially of the action of hydrogen under pressure of about 150 to 200 atmospheres on coal, at temperatures of about 400 to 500° C. Experiments show that hydrogenation takes place over a limited range of temperatures only, the speed of hydrogenation increasing with rising temperature to a limit which is governed by the velocity of coking; recent information points to the inhibition of coke formation by the addition of water. There is also a minimum partial pressure of hydrogen below which hydrogenation will not take place, which necessitates the use of a gas containing at least 80 per cent. of hydrogen. Up to 4·5 per cent. of the hydrogen enters the coal molecule. The success of this operation in practice would appear to be governed to some extent by the expense of the hydrogen, and Bergius, who has carried out over 2,000 experiments on a laboratory scale, now appears to be meeting with difficulty in obtaining supplies of the gas for his large plant.

Berginising British Coals

Broadly speaking, British bituminous coals will yield, under these conditions, up to 50 to 60 per cent. of tar, 15 to 20 per cent. of gas, and 10 per cent. of solid organic matter representing unchanged or partly changed coal, and coals designated as of inferior grade for ordinary purposes are quite suitable for hydrogenation, although those with less than 85 per cent. of carbon content give the most favourable results. The tars obtained contain as a rule a good deal of pitchy and asphaltic matter.

The Bergius process is a distinct advance over low-temperature carbonisation from the point of view of liquid fuel formation, as not only is a larger production obtained but there is no large amount of disposable residue left behind. The spirit fraction would make an excellent substitute for motor fuel, indeed it should be superior to many petrols at present on the market, and the pitches formed certainly bear a closer relationship to true pitch than the low-temperature variety, although the ash content is high. Attempts to prepare a satisfactory lubricating oil from the higher fractions without further treatment do not appear to have been very successful.

As already mentioned, coal can be carbonised at high or

low temperatures resulting in yields of coke, tar and gas differing considerably from each other in constitution. The residual coke from both these processes can be followed by complete conversion into gaseous and oil products, water gas being the medium whereby this can be done. This gas can be obtained by passing steam through incandescent carbon. At temperatures of 1,000° C. carbon monoxide and hydrogen are the chief products. The Badische Anilin und Soda Fabrik succeeded in converting this gas mixture into liquid products, consisting of hydrocarbons, alcohols, ketones, aldehydes, organic acids, and water. The technique followed was that of passing the water gas, at a pressure of about 100 atmospheres, over a catalyst heated to from 300 to 400° C.

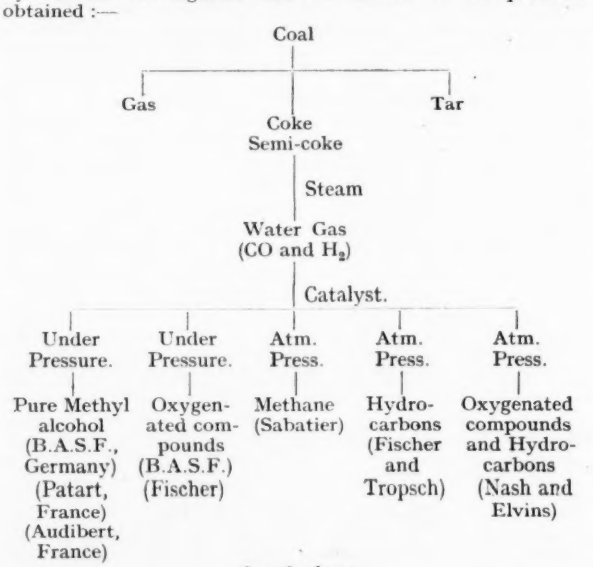
The formation of oxygenated compounds by catalysis under pressure has been studied in Germany by the B.A.S.F. and by Fischer. The latter investigated the former's patent of 1913, and developed an iron-alkali catalyst with the object of synthesising a mixture of compounds suitable for use as a fuel in internal combustion engines. Fischer states that he has tested his synthetic mixture in a 4 h.p. motor cycle, and found it to be a satisfactory fuel.

Until a short time back it was thought necessary for the reaction to be carried out under high pressure in order to produce these synthetic fuels, but an unexpected development in the interaction of carbon monoxide and hydrogen has opened up new ground in the field of synthetic fuel: a process has been investigated which is carried out at atmospheric pressure whereby these gases are converted into hydrocarbons similar to petroleum.

Fischer's Recent Process

This process was described by Fischer at Mulheim, and depends on the use of catalysts prepared from mixtures of reduced oxides containing iron and cobalt. Passed over such catalysts a mixture of carbon monoxide and hydrogen is converted, at temperatures in the neighbourhood of 270° C., into water, carbon dioxide, gaseous, liquid and even solid hydrocarbons, the latter resembling vaseline in appearance. Fischer states that no oxygen compounds were formed, and the various hydrocarbons produced, as is to be expected, were free from sulphur; so that if the process were carried out on a commercial scale it would be necessary only to separate the water formed and fractionate the hydrocarbons. It is of extreme interest to observe that the catalyst can be so modified that the proportion of high boiling constituents can be increased.

The following diagram sets out briefly the work carried out by various investigators and the nature of the products obtained :—



Conclusions

The greatest opposition which low-temperature carbonisation of coal is likely to encounter, should it ever develop to the commercial stage, would be as a result of the economic law of supply and demand. At present all the financial balance-sheets put forward in support of this process have shown the semi-coke priced at least as high, and in many cases higher, than the original coal, weight for weight. Should this smokeless fuel ever seriously compete with household coal, the time might arrive when the collieries would be forced to lower the price of household coal in order to dispose of it, and obtain their profit from the coal sold for carbonising purposes. Again, the necessity of disposing of both the semi-coke and the tar in the proportion of, say, 14 cwt. of the one to 14 to 20 gallons of the other, is a problem which is not so simple to solve as it appears on paper.

Low-temperature tar can never replace petroleum in normal times, and the cost of working it up into any product other than fuel for internal and external combustion would be excessive at the present time. The Bergius process would appear to have a more doubtful future in this country in normal times, from the point of view of liquid fuel production, than low-temperature carbonisation.

The chief difficulty in the way of its successful exploitation on commercial lines, with crude petroleum at or about its present price, would appear to be capital, maintenance and running costs. The construction of a plant for large quantities offers extraordinary difficulties, as apart from those of a purely constructive nature, such as obtaining pressure-tight seals, safe working joints and valves, and the very extensive apparatus for the testing of the plant, care must be taken to permit of an accurate temperature control. The question of a sufficient and cheap hydrogen supply is one to be considered; also the manipulation of a plant of this kind would appear to be beyond the skill of the average artisan, and wages and salaries are likely to be high.

In conclusion it should be mentioned that there are two financial balance-sheets which can be prepared when considering the value, as auxiliary sources of liquid fuels, of the products described in this paper. With crude petroleum at its present price none of the methods given, with the possible exception of the destructive distillation of oil shale (provided it is rich enough), torbanite, etc., would appear to be a paying proposition, but with crude oil selling at a greatly enhanced figure, as it did in this country during the War, all the processes dealt with should not only pay handsomely, but should provide an adequate and valuable home supply of liquid fuel.

Preparation of Lead Tetraethyl

Two Japanese workers, T. Tanaka and T. Kuwata, have been engaged at the Imperial University at Tokyo in studying the preparation of lead tetraethyl from ethyl chloride by means of the Grignard reaction. Lead tetraethyl was obtained by the action of lead chloride upon ethyl magnesium chloride below 5° C. The crude product was purified by treating the ethereal solution with oxygen in the presence of dilute hydrochloric acid until it was colourless and crystallising out the triethyl lead chloride present in the solution. The lead tetraethyl had an unpleasant odour and boiled at about 82° C. under 11 mm. pressure. It decomposed on heating to 400° C., and at ordinary temperatures became turbid on exposure to air and sunlight. The work is described in Report No. 29 of the Aeronautical Research Institute of the Imperial University Tokyo.

Platinum in Sierra Leone

THE Government of Sierra Leone has received a considerable number of applications in connection with the discovery of platinum in that colony, which was made public on January 3 last. Prospecting rights have been granted to all suitable applicants, and the Government of the colony hopes before long to be able to give a decision regarding the grants of exclusive prospecting licences, mining rights, or mining leases. The Sierra Leone Government, however, considers it desirable to announce that applications for exclusive prospecting licences have already been received in respect of practically the whole of the area specially suggested by the Director of Geological Survey as being worthy of investigation. All inquiries regarding the discovery should be addressed to the Sierra Leone Government direct, and not to the Colonial Office.

The Chemist and the Agricultural Industry

Some Interesting Notes on Fertilisers

Nitram, Ltd., is now issuing regularly a journal known as "Farm Notes on Profitable Farming." The current issue contains several topical articles, from which are abstracted a number of interesting points, given below.

AMONG the matters of interest in the current number of the Nitram publication, *Farm Notes*, is a statement by Mr. F. C. O. Speyer, director and general manager of the concern, on the policy of Nitram, which is as follows: To make the fertilisers which the farmer wants, and to sell them to him at the lowest possible price; to describe the contents of the fertilisers clearly; to maintain stocks within easy reach of the farmer during the consuming season; and to render every possible assistance to the distributor and the farmer through the expert salesmen attached to the district offices of I.C.I.

Developments at Billingham

Mr. P. C. Dickens, a director of Synthetic Ammonia and Nitrates, Ltd., writes on "Billingham." Among the by-products of the production of ammonium sulphate is chalk (calcium carbonate), which is known as "Billingham carbonate of lime," and contains 1¼ per cent. of ammonium sulphate. This is proving of value in the treatment of soils deficient in lime. Constructional work is taking place at Billingham with a view to enlarging the plant, and various new fertilisers will be produced shortly. It is of some interest to survey the products which are being or will be made at Billingham, although some of them are not of direct value to the farmer.

Present and Prospective Products

Ammonium bicarbonate is being produced, which is used for neutralising purposes in sulphate of ammonia plants. Abroad it is also used for baking, just as sodium bicarbonate is used in this country. Another product is anhydrous ammonia, which is ammonia as 100 per cent. ammonia, used mainly for refrigerating purposes. Nitric acid can be used for various purposes, including the production of dyestuffs, explosives, paints, varnishes, etc. In the production of nitric acid, sodium nitrite is produced, which is used in the manufacture of dyestuffs.

Chalk, which has already been mentioned, can be used for the manufacture of cement, and tests which have been carried out have proved that the cement is in every way superior to the standards laid down in this country. Methanol is produced by the combination of carbon monoxide and hydrogen in the presence of a catalyst at a high pressure and fairly high temperature; in fact, by processes very similar to those employed in the production of ammonia. This is used for the production of industrial spirit and in the manufacture of dyestuffs. Methanol is converted into formaldehyde, which is an important raw material in the manufacture of artificial resins and indigo. It is also a very valuable disinfectant and seed-dressing.

Nitro-Chalk

Great interest attaches to nitro-chalk, a mixture of nitrate of ammonia and carbonate of lime, which is a valuable fertiliser, especially as top-dressing. It analyses as follows: total nitrogen, 10 per cent., of which 5 per cent. is present as nitrate and 5 per cent. as ammonia; calcium carbonate, 64·7 per cent., including lime 36·2 per cent. The current issue of *Farm Notes* contains an account of trials carried out with nitro-chalk. Applied as a top-dressing, it gave better results than nitrate of soda, sulphate of ammonia, or nitrate of lime for sugar beet; better results than nitrate of soda for mangels; while the trials indicate also that nitro-chalk is at least as effective as nitrate of soda, nitrate of lime, or sulphate of ammonia as a top-dressing for arable crops or hay.

Lime

Dr. J. A. Hanley, principal of the Royal Agricultural College, Cirencester, writes on "Lime for Spring Crops." He points out that it is often said that any form of lime is a slow-acting manure, and it is frequently believed that a farmer has to wait several years before getting adequate returns from an application. This is, however, not the case, if the right material is applied in the right way.

The materials generally used are either burnt lime in lump form, burnt lime ground and usually referred to as "ground lime," and carbonate of lime as ground chalk, ground limestone, or as a by-product from industries of which waste whiting and Billingham lime are examples. All these materials are satisfactory; but in the case of both forms of burnt lime certain wastage is experienced if they are not properly applied. As everyone knows, they take up moisture and slake forming a fine dry powder. If this dry powder is left lying about on the surface of the land it absorbs still more moisture, becomes very sticky, and then sets hard. Any hard lumps thus formed are wasted. The lime which really does good is that which disappears very soon after it is applied.

When using lump lime it is necessary to ensure its thorough incorporation with the top soil whilst still in the dry powdery slaked form. Worked in in this condition its effect is immediate. Burnt lime should never be ploughed in. Carbonate of lime is not so wasteful. Although it may be sticky when wet, it will not set hard, but will fall to a fine powder on drying; it can then be worked in. It must be finely ground and as free as possible from coarse gritty particles. Ground chalk and similar materials may be left on the top for some time after their application to the land without fear of deterioration.

Every year there is fresh evidence of land deteriorating through a discontinuance of the use of lime. Land is more reliable, more drought-resisting, easier to work, more adaptable to changes in cropping, and altogether more suitable for intensive cultivation if lime is used regularly.

Mixed Fertilisers

Mr. G. J. Stewart, Deputy Chief Education Inspector in the Ministry of Agriculture, writing on "Mixed Fertilisers," makes an interesting suggestion. It may, he says, be urged that the manure merchant will mix fertilisers to order, in accordance with the prescription of his client. While this may be possible in the case of large consignments, it is quite impracticable with small orders in the rush of the spring season. What is really wanted is for the manure merchants and the scientific staffs of our educational institutions to put their heads together and agree upon formulæ suitable for particular crops in areas that have been specially surveyed and defined. And just as certain manufacturers of compound feeding stuffs now disclose the actual composition in terms of the ingredients used, it might be worth considering whether manure merchants should not, in addition to fulfilling their statutory obligations, declare the actual ingredients used in their compounds.

French Chemical Amalgamation

ARRANGEMENTS have been completed for the fusion of the Usines de Rhône and the Etablissement Poulenc Frères, the former increasing its capital from 27 to 36 million francs by the issue of 90,000 new shares to Poulenc shareholders in the ratio of three Rhône shares for every four Poulenc. The company will be known in future as Société des Usines Chimiques Rhône-Poulenc. The combination is the complement of that achieved some years ago between the Kuhlmann interests and the Compagnie Nationale des Matières Colorantes, the latter representing heavy chemicals and the former light ones. The Usines de Rhône and Kuhlmann, however, are both interested in artificial silk, the former sharing with the Viscose group the control of Rhodiaseta and the latter having recently joined with Dollfus Mieg and the Etablissements Agache (Pérenchies) to promote the Société des Textiles Chimiques du Nord et de l'Est, which is to incorporate the Borvisk Française.

Germany and China Clay

ACCORDING to an Exchange Telegraph message from Berlin, a firm price agreement respecting China Clay among the national associations is not expected there, despite the friendly attitude of England. It is hoped that agreement may be reached in regard to the distribution of markets. It is pointed out that Germany nowadays takes from England only one-third of the pre-war quantity of China Clay.

Society of Public Analysts

Abstracts of Papers

An ordinary meeting of the Society of Public Analysts was held in the Chemical Society's Rooms, Burlington House, London, on Wednesday, April 4, the president, Mr. Edward Hinks, being in the chair.

Certificates were read for the first time in favour of A. D. Gay, J. G. Mayne, R. A. McNicol, M.Sc., A.I.C., W. R. Orrell, B.Sc., A.I.C., L. F. Smith, M.Sc., A.R.C.S., D.I.C., A.I.C., and C. F. Turner, F.I.C. Certificates were read for the second time in favour of F. R. Hill, B.Sc., A.I.C., E. T. Illing, B.Sc., F.I.C., F. Iskander, H. B. Marston, B.Sc., A.I.C., R. J. Munro, B.Sc., A.I.C., J. R. Nicholls, B.Sc., F.I.C., H. G. Reeves, D.Sc., Ph.D., F.I.C., G. Walsh, B.Sc., A.I.C., R. G. Warren, B.Sc., and W. A. Waygood, B.Sc., A.R.C.S., O.I.C. The following were elected members of the Society:—J. E. Aps, E. E. Billington, M.Sc., R. C. Chirnside, and R. D. Awen, A.I.C., A.M.I.Chem.E.

Abstracts of papers read before the Society of Public Analysts on Wednesday, April 4, 1928:—

Coffee Parchment

"Coffee Parchment as an Adulterant of Bran and Sharps" was the title of a communication from J. Evans and T. E. Wallis. It was stated that the practice of adulterating bran and sharps with coffee parchment husk had recently been revived. The "parchment" consisted of the thin and tough endocarp of the coffee fruit, and might be recognised by its distinctive cellular structure. When added to sharps it was usually finely comminuted, and in testing a sample a few of the suspicious pieces should be boiled with chloral hydrate solution until transparent, and a fragment mounted in chloral hydrate for microscopical examination.

Colour-producing Constituents of the Cacao Bean

Mr. W. B. Adam read a paper on the "Determination of the Colour-producing Constituents of the Cacao Bean." Mr. Adam pointed out that the two principal colour-producing constituents in the cacao bean were cacao catechin and cacao tannin. The former had been extracted with ether (after previous removal of fat and xanthine base) and determined colorimetrically by means of Mitchell's ferrous tartrate reagent, whilst the cacao tannin was extracted with hot water and determined by precipitation as cinchonine tannate. Analytical figures were given showing the percentages of catechin and tannin in the principal classes of cacao beans. The work had shown that the catechin was destroyed during fermentation, and the tannin was reduced to about 2 per cent.

Determination of Vanadium in Steel

A method for the "Determination of Vanadium in Steel" was discussed by Dr. A. T. Etheridge. The method consisted in removing iron (as chloride by extraction with ether) and other interfering metals by electrolysis over a mercury cathode, leaving a solution in which the vanadium could be determined by titration with permanganate. The process had been proved to be accurate for all kinds of steels. In the case of molybdenum steels the molybdenum was removed together with the ferric chloride on extraction with ether. Manganese, like aluminium, had no influence on the final permanganate titration.

Colorimetric Determination of Antimony

The "Colorimetric Determination of Small Quantities of Antimony and their Separation from Tin" was dealt with by Mr. S. G. Clarke. The antimony was deposited on metallic copper as in the Reinsch method, the deposited film stripped off by means of sodium peroxide, and the antimony determined colorimetrically by converting it to the golden-yellow compound formed by its interaction with pyridine and an iodide, and matching the colour with that produced by a standard solution of antimony. The method was applicable to antimony in either state of oxidation, and in the presence of tin or arsenic, but bismuth and several of the other heavy metals gave precipitates, usually coloured, with the reagents.

Carbon Dioxide in Soils

Dr. A. Riad discussed the "Determination of Carbon Dioxide in Soils." Hepburn's modification of the Van Slyke method of determining carbon dioxide in carbonates (in which the evolved gas was absorbed in standard baryta solution, the excess of which was titrated with oxalic acid), had been adapted to the determination of carbon dioxide in soils. The result quoted showed that the method might be recommended as a suitable one for general soil analysis.

Interesting Food and Drug Case

Vitamins and Cod Liver Oil

The Salford Stipendiary Magistrate (Mr. Atkin) had before him on Wednesday, April 4, a prosecution by the Salford Corporation against Boots' Cash Chemists (Lancashire), Ltd., on a charge of selling an article not of the nature, substance, and quality demanded under the Food and Drugs Act. Mr. H. Tomson prosecuted, and the defendants were represented by Mr. J. Whitehead, K.C., and Mr. G. S. W. Marlow.

Mr. Tomson said that an inspector bought some cod liver oil tablets at the Regent Road (Salford) branch of Messrs. Boots. Later Mr. H. H. Bagnall, public analyst, reported that the sample submitted to him contained 3.2 per cent. of oil that had the characteristic of an alcoholic extract of cod liver oil. Vitamin A was entirely absent. The report continued: "These were not cod liver oil tablets, since the oily matter in them lacked the essential vitamin A, which was one of the most valuable constituents of genuine cod liver oil, and gave it a large part of its therapeutic value. The value of the contained oil apart from its lack of vitamins was negligible, inasmuch as about 160 tablets would be necessary to obtain the minimum dose of cod liver oil." The tablets were also analysed by Mr. Elsdon, analyst for the county of Lancashire, and, except for a few unessential details, the result was the same. Animal experiments at the laboratories of the Pharmaceutical Society showed the absence of vitamins A and D.

Evidence of the purchase of the tablets was given by Mr. W. S. Bowker, food and drugs inspector. Cross-examined by Mr. Whitehead, he said that he expected to get McCoy's cod liver oil tablets, but that he had simply asked for cod liver oil tablets. He knew that McCoy's tablets were a proprietary article. Evidence in regard to chemical analysis was given by Mr. Bagnall and Mr. Elsdon, and in regard to experiments on animals by Dr. J. H. Burn and Dr. Katharine Coward, of the Pharmaceutical Society.

Evidence for the Defence

Mr. Henry Droop-Richmond, chief analyst at the Boots laboratory in Nottingham, stated that it was not until the present prosecution had been started that he handled the McCoy cod liver oil tablets. He had never made any tests as regards the absence of vitamin D. Messrs. Boots received certain essences from McCoy's, and these were subsequently made up in tablet form. That was all his firm had to do with their manufacture. The tablets were made up from the formula of McCoy's firm, who supplied the two main ingredients. He had applied the usual colour test, and, although this failed to disclose vitamin A, it was when he made another examination that he discovered the presence of the necessary vitamin which had been inhibited during the first examination by the presence of other ingredients. He estimated that, generally speaking, there was from 8 to 9 per cent. of cod liver oil in the tablets.

Mr. Whitehead, for the defence, submitted that in the absence of any definite standard by the British Pharmacopœia the prosecution had failed to show that what was sold was not of the nature, substance, and quality of the article demanded. The American standard had been introduced, but that was not one that could be applied under their territorial jurisdiction. It was not denied that there could be varying quantities of vitamin A in natural cod liver oil. It was exceedingly difficult for any court to lay down a new test or standard. None of the witnesses for the prosecution had applied the particular test, that had been carried out by Mr. Droop-Richmond. He further submitted that his clients, not being concerned with the manufacture, were not prepared with any evidence regarding the animal tests. It was, in fact, a proprietary article, and the defendants were entitled to a dismissal.

The Magistrate inflicted a fine of £30 and £75 costs. He said that he would be prepared to state a case for appeal.

Chemical Workers and I.C.I. Policy

Resolutions at Trade Union Conference

THE annual conference of the National Union of Drug and Chemical Workers was held in London on Sunday and Monday, April 8 and 9.

Mr. S. Ellam, the president, referring to the peace in industry movement, said that, reduced to a state of practical helplessness, the trade union movement could not afford even by implication to suggest the possibility of peace when they knew there could be peace. Sir Alfred Mond was not unaware of the present state of trade unionism in Great Britain, and knew that the trade union movement was incapable of embarking on any policy of militant defence of working class interests.

The conference unanimously carried a resolution, moved by Mr. Warren and seconded by Mr. Miller, which expressed the view that the new labour policy of Imperial Chemical Industries, Ltd., was a movement fraught with manifold dangers to the chemical workers in Britain, and that the objects of the policy were to eliminate all forms of trade unionism in the combine's works and to isolate the combine's workers from British organised workers with a view to reducing their active opposition to the combine's policy of rationalisation, which might result in excessive speeding up of production, followed by periodical short time or complete loss of employment for many.

Unanimous approval was given to a resolution, moved by Mr. R. G. L. Bowyer, seconded by Mr. Miller, that the movement initiated by Sir A. Mond had for its real objective the weakening of organised labour's resistance to a rationalisation of industries scheme, whereby British capitalism might recover its competitive power in the world's markets at the expense of the working class. It was urged that before there was co-operation in such schemes there should be guarantees for the reinstatement of workers who lost employment after the general strike, acceptance of the principle of union labour only, and recognition of shop stewards and committees and their powers to regulate the working conditions under any rationalisation schemes.

Wages and Conditions of Industrial Chemists

Among resolutions carried was one, moved by Mr. Bossifer and seconded by Mr. Silver, which registered a protest against the wages and conditions offered to pharmacists and industrial chemists. Dealing with work places in which celluloid was handled or manufactured, a resolution was carried calling upon the Government to set up stringent regulations to protect the workers from fire dangers. Such regulations, it was recommended, should prohibit the employment of persons under 18 years of age, should require the erection under licence of fireproof buildings, containing automatic flooding machinery, and should further require that productive work be under the control of experienced chemists and charge hands, and that fire drill should be compulsory.

A similar resolution instructed the National Executive Council to call the attention of Government departments to the need of more frequent and closer inspection of work places in the drug and chemical industry.

Society of Glass Technology: Annual Meeting

THE eleventh annual general meeting of the Society of Glass Technology will be held at the University of Sheffield on Wednesday, April 18. Mr. W. Butterworth, Senr., M.A., has again been nominated as president, and Professor W. E. S. Turner as honorary secretary. Following the annual general meeting, an ordinary general meeting will be held, at which the following papers will be read and discussed:—"Some New Facts arising from a Study of the Basing of Colourless by Coloured Glass," by Dr. S. English, Professor W. E. S. Turner, and F. Winks; and "The Control and Distribution of Temperature in Lehrs," by A. Cousen, H. W. Howes, and F. Winks. The address of the president (Mr. W. Butterworth, Senr.) will be delivered at the University, Sheffield, on Tuesday evening, April 17, and will take the form of an illustrated lecture on "Stained Glass of the Renaissance Period." The society now numbers over one thousand members, drawn from 24 countries.

The Iodine and Bromine Industries

Two Valuable Reports

THE Imperial Institute has performed a very useful service in the publication of a pamphlet on *Iodine* (H.M. Stationery Office, pp. 21, 6d.). In this publication (one of the series dealing with the mineral industry of the British Empire and foreign countries), the occurrence, uses, extraction, prices and control, production, etc., of the element are discussed, both as regards the Empire and countries outside it. It is indicated in the pamphlet that even if there is an increase in the consumption of iodine in various directions in which it is now used, the amount consumed will still be small compared with the potential production in Chile alone. To increase consumption, other outlets must be sought, including perhaps many purposes for which bromide is now used. For large scale industrial use, the price of iodine would have to be reduced considerably and this depends on the modernisation of the methods of extraction used in Chile. Some very useful information is given in the section on prices and control, especially in regard to the Association of Iodine Producers in Chile, and the International Combine, which is composed of the Chilean Association together with the Scotch and French producers; and also in the section on production. For the three-year period 1923–25, the percentage outputs of the various countries in relation to the world's total were: Chile, 75·8; Japan, 7·3; France, 7·2; Java, 4·7; United Kingdom, 4·5; and Norway, 0·5. The actual production over the whole world amounted in 1925 to 955 long tons, distributed as follows: Chile, 783; United Kingdom (from seaweed) 25; France, 53; Norway, 5; Japan, 60; and Java, 37 (these figures are supplied by the Chilean Association, and in a few cases official figures are higher). The trade of the United Kingdom in iodine and iodides (excluding ethyl and potassium iodides) in 1926 was: imports (less re-exports), 1,543,785 lb.; domestic exports, 91,692 lb. In 1926, Canada imported 11,814 lb. and Australia 1,608 lb. of iodine, and Canada imported 15,804 lb. in 1927. Apart from the iodine in Chilean nitrate, and that obtained from seaweed, iodiferous waters occur in Java and Papua; from Java increasing outputs may be expected in the future.

The Bromine Position

The Imperial Institute has also issued a companion volume on *Bromine* (pp. 19, 6d.). There is first of all an account of the occurrence of bromine and of its methods of transport. The uses of bromine now include the large amount required for the manufacture of ethylene bromide for use in the incorporation of lead tetraethyl in petrol. The greater part of the bromine now used in the world is obtained from the potash deposits at Stassfurt, Germany, the various brines of the United States furnishing practically all the remainder. The bromine is usually recovered from these sources either by means of chlorine or by electrolysis. Some striking facts about cost of production and prices are given in the present publication. The price of bromine (c.i.f. U.K. ports) in ton lots, as regulated by the Deutsche Bromkonvention Gesellschaft at the end of 1922, was £35 to £35 10s. per ton; whereas in September, 1927, it was £170 per ton (eighteenpence per lb.). The present f.o.b. cost in Germany is probably not more than 6d. per lb. Figures for 1926 indicate that in that year Germany produced 27,215 cwt. of bromine, and the United States 11,123 cwt. Bromine is not produced within the British Empire, but it could be obtained if necessary from the Dead Sea (where the reserves seem almost unlimited), or from the Rann of Cutch in India. Doubtless more will be heard of this when the question of the exploitation of the Dead Sea has reached a more advanced stage. The import of bromine into the United Kingdom (less re-exports) in 1926 amounted to 5,034 cwt., chiefly from Germany, while domestic exports amounted to 202 cwt.

Vitaglass Manufacturing Arrangements

CHANCE BROTHERS AND CO., LTD., of Smethwick, announce that the trade mark "Vita," and the business of manufacturing the glass, has been assigned to Pilkington Brothers, Ltd., of St. Helens, Lancashire. This step has been taken in order that this glass may be available in all the ordinary varieties used for glazing purposes and particularly in polished plate glass. The technical knowledge and experience of Chance Brothers will be at the disposal of Pilkington Brothers, and the two companies will work in close co-operation.

A Recent Chemical Appointment

Mr. C. Gordon Smith

THERE is reproduced below a photograph of Mr. C. Gordon Smith, M.Sc., chief assistant in the laboratories of Alfred Holt and Co., Ltd., of Liverpool, who has been appointed

chief chemist to the Salt Union, Ltd., of Winsford, Cheshire, in succession to Dr. W. E. Gibbs, who has been appointed to the Ramsay Chair of Chemical Engineering at University College, University of London.

X-Ray Investigation of Liquids

Interesting Indian Research

FOR some time past, Professor C. V. Raman, of Calcutta, has been carrying on work on the investigation of the structure of liquids, by means of X-rays. In the course of a letter to *Nature*, Professor Raman and his collaborator, Mr. C. M. Sogani, describe some results obtained recently :

" The experimental studies described in a previous note," they state, " have been continued by one of us (C. M. Sogani), and the structure of some thirty-five liquids has been studied by X-radiation. The twenty aromatic liquids examined indicate a remarkable variation of the structure of the diffraction halo with the form, position, and mass of the substituent groups which replace the hydrogen atoms in benzene. Ortho-, para-, and meta-compounds are readily distinguished by their X-ray liquid haloes. When the benzene ring is loaded in an unsymmetrical manner, there is a broadening of the halo, which is the more striking the heavier the mass of the substituent group. The research furnishes numerous examples of this effect, a striking illustration being the difference in the haloes due to aniline and nitro-benzene respectively. In several of the liquids, the halo becomes doubled, a good example being that of mesitylene, where the two rings are of nearly equal intensity.

"The aliphatic liquids examined include several of the paraffins, some alcohols, and an extended series of the fatty acids, ranging from formic acid up to brassidic acid, which has a chain of 22 carbon atoms. The results confirm the prediction of Raman and Ramanathan (*Proc. Ind. Ass. Cult. Sc.*, Vol. 8, p. 154; 1923) that with such asymmetrical molecules, we may have more than one halo, the sizes of which correspond to different special configurations of neighbouring molecules relatively to each other in the liquids. The most striking illustrations of this are furnished by acetic acid and glycerine, each of which gives two haloes, corresponding respectively to the mean distance between neighbouring molecules, which lie side by side and those which lie end to end. With very long molecules, however, only the former type of halo appears on the plates, and its size, as expected, is found to be independent of the length of the carbon chain. With the earlier members of the aliphatic series, noticeable variations appear both in the size and the character of the halo with increasing length of the chain."

Chemical Matters in Parliament

The Restrictions on Rubber Industry

The Prime Minister announced, in reply to a question by Sir M. Manningham-Buller (House of Commons, April 4), that the Government had received the report of the Committee of Civil Research on the question of rubber restriction, and they had decided that all restrictions on the export of rubber from British Malaya and Ceylon should be removed on November 1, 1928, the existing scheme being continued unaltered in the meantime.

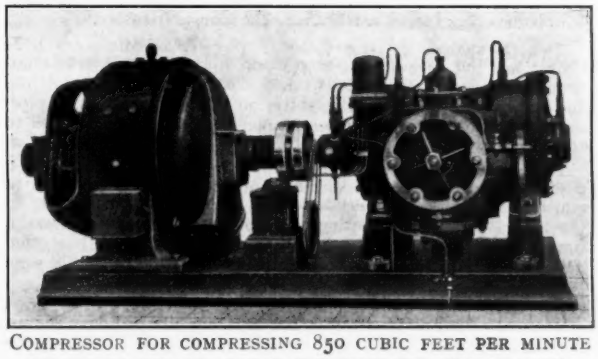
American Report on Lead Tetraethyl

In reply to Commander Bellairs (House of Commons, April 5), Mr. Locker-Lampson said that he would obtain a copy of the report of the American Commission on the use of lead tetraethyl in motor spirit and would place it in the library of the House.

Air Compressors for the Chemical Industry

THE rotary air compressor is the outcome of the need for a design free from the limitations imposed by the use of heavy pistons and other reciprocating parts, by valves, valve gear and springs, stuffing boxes and packing. The Holland S.L.M. air compressor and vacuum pumps, which are described in a catalogue just issued by Bernard Holland and Co., London, consist essentially of a fixed casing in which is a rotor, fitted with blades, free to move radially.

As the rotor is smaller in diameter than the bore of the stator and is placed eccentrically within it, there is a crescent-shaped space between them. When the rotor is revolved the blades are maintained by centrifugal force in contact with the floating rings and casing. The crescent-shaped space is divided by the blades into cells which, in turn, expand from a minimum to a maximum cubic capacity (suction period) and then decrease to a minimum cubic capacity (compression and



COMPRESSOR FOR COMPRESSING 850 CUBIC FEET PER MINUTE OF GAS TO ONE LB. GAUGE PRESSURE PER SQUARE INCH.

delivery period). Floating rings near each end of the rotor revolve in unison with it. These rings take the centrifugal thrust of the blades, restricting and controlling their pressure. The consequent reduced rubbing velocity and low friction and the absence of reciprocating parts and valves allow a high speed of revolution without vibration or perceptible wear after long and continuous use. The compressors and vacuum pumps can be run at speeds suitable for direct coupling to electric motors, steam or internal combustion engines or other fast-running prime movers. They may also be belt or chain driven. Both compressors and vacuum pumps, if arranged with suitable piping and stop valves, will perform the dual service of compression and exhausting.

In the chemical, soap, paper making and food industries rotary compressors are used for agitating, pumping and raising liquids, emptying containers and vessels, and in connection with oxidising, drying, etc. The S.L.M. compressors or vacuum pumps are made in single stage or two stages. The compressors are made in various sizes to deliver from 6·5 up to 3,800 cubic feet of free air per minute. The delivery pressure varies from 5 to 150 lb. per square inch. The single stage vacuum pumps are made for 60 per cent. or 95 per cent. vacuum, and the two stage, water-cooled pumps for exhausting to 99·9 per cent. vacuum.

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From Week to Week

THE ADDRESS OF TENNANTS (LANCASHIRE), LTD., has been changed to 275A, Burlington Street, Liverpool; telephone, North 709.

WILLIAM E. WEISZ, director of the Sterling Products Co. (of America), has assumed control of sales in the United States of synthetic perfumes manufactured by the I.G.

STATED TO HAVE BEEN SCALDED on the arms at the works of Synthetic Ammonia and Nitrates, Ltd., Joseph Smith, a West Hartlepool engine-fitter, aged 50, died on Monday while on the way to hospital for treatment.

A SMALL SCALE PLANT for experimental paint and varnish work is now available, at the Borough Polytechnic, London, for the use of consulting chemists and others interested in the paint trade. Particulars as to fees, etc., may be obtained from Dr. E. C. Pickering, Borough Polytechnic Institute, Borough Road, London, S.E.1.

M. GEORGES CLAUDE, well known for his work on the fixation of atmospheric nitrogen, is standing as a candidate to represent Fontainebleu in the forthcoming French Parliamentary elections. His candidature is scientific and not political, and his appeal points out that the future of France depends on her scientific development.

THE WAGES AGREEMENTS in the German chemical industry, which were due to expire on March 31, have been extended until March 31, 1929, subject to certain agreed increases. For the majority of workers the increase is equal to seven pfennigs (about three farthings) an hour, while to some it means an increase of 9½ per cent.

THE IMPORTS OF AMMONIUM SULPHATE into the United States from Europe during January aggregated 5,448 long tons, of which 4,642 was of German origin. The United Kingdom was credited with 537 tons, Mexico 170, and Belgium 99. There were also imported during January 7,121 tons of ammonium sulphate nitrate, all of German origin.

REPRESENTATIVES OF THE RUSSIAN SOVIET have recently visited Chile and entered into contracts for further supplies of nitrate of soda, states a Santiago correspondent of *The Times*. The headquarters of these representatives is Buenos Aires. They were officially received by the Minister of Finance, Señor Pablo Ramirez, who is devoting special attention to the nitrate industry.

THE SECRETARY OF THE S.M.R.C. (Society of Miniature Rifle Clubs) has put forward the suggestion that miniature rifle clubs should be formed in chemical works. The formation of a club and the provision of ranges are, he states, not difficult matters. Information on the subject may be obtained if letters are addressed to the Secretary, S.M.R.C., 15, Arundel Street, Strand, London, W.C.2.

DAMAGE ESTIMATED AT £3,500 resulted from a fire which occurred early last week at Four Ashes Station, near Wolverhampton, in which were involved about 200 tons of tar residue, the property of the Four Ashes Manufacturing Co., Ltd., carbon manufacturers, a branch of Mayor and Co., Ltd., Monmore Green, Wolverhampton. The heat was so intense that the up-line and shunting rails were twisted.

IMPERIAL CHEMICAL INDUSTRIES, LTD., as we go to press announces a final dividend of 5 per cent. on the ordinary shares, making 8 per cent. in all, and a dividend of 1¼ per cent. on the deferred shares. Sir Alfred Mond also announces the formation of an Anglo-American Company with a capital of £2,000,000, the shares being held in equal proportions by I.C.I. and the Chase Securities Corporation.

A COMMITTEE has been formed for the purpose of raising a fund to assist in the education of the children of the late Dr. Weyman, who at the time of his death last year was chief chemist of the Newcastle and Gateshead Gas Co. Professor Arthur Smithells is the chairman of the committee, and the honorary treasurer is Mr. T. F. E. Rhead, of the Central Laboratory, the Gas Works, Nechells, Birmingham.

CONTRIBUTIONS TO THE FUND organised by the Lord Mayors of London, Cardiff and Newcastle-on-Tyne, for the relief of distress in the coalfields include £1,000 from Imperial Chemical Industries, Ltd., £500 from Sir Alfred Mond, £250 from Sir Harry MacGowan, and £100 from Mr. Emile Mond. At the meeting of the Amalgamated Anthracite Collieries on Tuesday, April 3, Sir Alfred Mond announced that he and his co-directors had allocated the whole of their directors' fees, amounting to £6,000, to the fund.

THROUGH THE GENEROSITY of Imperial Chemical Industries, Ltd., a commodious residence has been converted into a social clubhouse for the use of the workmen employed at the firm's ammonia-soda works at Burn-Naze, near Fleetwood. The club, which has already a membership of nearly 1,000, was formally opened recently by Mr. W. F. Lutyens, general manager of the works. The club committee has presented to Major G. H. Brunner, chief engineer, a silver ashtray in recognition of the help he has given in obtaining the house for members.

OUR ADVERTISEMENT COLUMNS this week contain details of the sale of a large amount of chemical and mechanical plant for the handling and manufacture of coal by-products (p. **xxix**).

WHEN PUTTING A BELT on a revolving pulley in the bleaching department of the Crossly Hall dyeworks of W. North and Co., Ltd., Bradford, Vernon Miller, aged 44, had his neck broken, on Thursday, April 8.

LORD BLEDISLOE, chairman of the Imperial Grasslands Association, which has been formed under the auspices of I.C.I., is to be married shortly to the Hon. Mrs. T. Cooper-Smith, daughter of the late Lord Glantawe.

THE FIFTH INTERNATIONAL CONFERENCE on refrigeration and cold storage was inaugurated in Rome on Tuesday, April 10 by the Minister of National Economy, Signor Belluzzo. Over 500 delegates were present, representing all the principal States.

SIR HARRY MCGOWAN, of Imperial Chemical Industries, is confined to his London house with an attack of diphtheria, which supervened on tonsilitis. The latest report indicates that he is recovering. He is however, isolated, and will not be able to see visitors for a fortnight.

THE DIAMOND FERTILISER AND CHEMICAL CO., LTD., of York, have removed their headquarters to London, and from April 10 have operated from 21, Corn Exchange Chambers, Seething Lane, London, E.C.3. Telephone: Royal 1154; telegrams: "Diacochem," Fen, London.

MR. E. I. LEWIS has resigned his post at Albright and Wilson, Ltd., and on March 1 joined the staff of the Mond Nickel Co., Ltd., and its subsidiary company, Henry Wiggin and Co., Ltd., Birmingham. Amongst other special duties, he will act as scientific adviser to the latter company, which is undertaking extensive developments.

THE BUXTON LIME FIRMS CO. undertook, at the Langside quarry on April 8, what is considered to be one of the most successful blasting operations in the history of Peakland quarrying. It was estimated that the amount brought down exceeded that of any other blast, the amount of stone liberated being stated to be in excess of 70,000 tons.

THE CACTUS RUBBER CO., of America, has been incorporated in California for the purpose of manufacturing synthetic rubber from the juice of cactus plants. Dr. John C. Wichmann, of Los Angeles, one of the officers in the new company, has two patents on a perfected process, which he claims will yield 156 lb. of concentrated juice from a ton of cactus material.

MR. ROBERT C. STANLEY, president of the International Nickel Co., in the annual report of the company for 1927, states that the estimates indicate that to complete the extension programme at the Frood mine, inclusive of mine development, smelter construction, installation of hydro-electric equipment and additions to the electrolytic refinery at Port Colborne, there will be required during the ensuing three years an expenditure of approximately $12,000,000, which amount is exclusive of the erection of an electrolytic copper refinery at Copper Cliff, if this is deemed desirable at a later date.

ARTIFICIAL SILK NEWS.—British Celanese, Ltd., have decided to make a reduction of a shilling a pound in the selling prices of all their yarns except those of 100 deniers, the reduction in respect of the latter being 6d.—It is now confirmed that the American Viscose Corporation will erect a new acetate plant with a capacity of 7,750,000 lb. yearly.—Imports of artificial silk yarn into the United States during February amounted to 1,145,000 lb., compared with 1,366,000 lb. in January.—The Société Suisse de Viscose announces net profits of 13,313,000 francs on last year's operations. The dividend is 450 francs, free of income tax.

Obituary

EDWARD JAMES HENRY MIDWINTER. He was elected a Fellow of the Institute of Chemistry in 1880.

KURT LICKFETT, a director of the I.G. Farbenindustrie A.-G., on March 29, at Frankfort-on-Main, aged 45.

WILLIAM DANCER, in Manchester, on March 16, aged 87. He was a pupil of Bunsen, had taught chemistry, and had been owner of a dyestuffs works.

DR. CHARLES WILSON EASLEY, professor of chemical technology in Syracuse University, on January 27, aged 51. After the publication in 1911 of his book, *The Vapour Pressure of Binary Mixtures*, he received the Nichols medal. He made determinations of the atomic weight of mercury.

DR. THOMAS B. FREAS, professor of chemistry at Columbia University, recently. He was a noted authority on chemical laboratory design and management, and was for a time chief chemist to the Western Electric Co., and also had connection with firms of scientific instrument makers.

JAMES HORATIO WATTERSON, on November 5, 1927, in his 48th year. He was lecturer in chemistry at Cheltenham Training College from 1903 to 1915, when he obtained an appointment as works chemist, under Dr. J. C. Cain, at the Huddersfield Works of British Dyes, Ltd., where he eventually became chief chemist and works manager.

References to Current Literature

British

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CELLULOSE.—A study of the lignocellulose of Victorian mountain ash (*Eucalyptus Regnans*). H. W. Strong. *J.S.C.I.*, April 6, pp. 87–90T.

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RUBBER.—Influence of the sulphur-rubber ratio on the physical properties of hard rubber. D. E. Pearsall. *Rubber Age*, April, pp. 47–51.

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ANALYSIS.—Estimation of —SOOH (sulphinic) group and ferric iron. S. Krishna and H. Singh. *J. Amer. Chem. Soc.*, March, pp. 792–798. Sulphinic acids (RSOOH) react with ferric salt solutions to form orange-yellow ferric sulphinates of the general formula $(RSOO)_3Fe$. The formation of such compounds is quantitative. It is used for the determination of ferric ions in the presence of ferrous ions, aluminium, chromium, nickel and cobalt, and also of the sulphinic acids.

CATALYSIS.—The effect of neutral salts on certain catalytic decompositions. C. C. French. *J. Phys. Chem.*, March, pp. 401–414. The velocity of decomposition of hydrogen peroxide by neutral potassium iodide, and of nitrosotriacetonamine by potassium hydroxide, in a number of different salt solutions has been measured at 25° C. with constant catalyst and varying salt concentrations.

ENGINEERING.—New heat transfer data for the scrubber designer. T. Rosenbaugh. *Chem. Met. Eng.*, March, pp. 144–148. The assumption that oil-gas may be considered as dry for cooler calculations is usually untenable. New data have been obtained with water-saturated gas.

Heat transfer for oils and water in pipes. F. H. Morris and W. G. Whitman. *Ind. Eng. Chem.*, March, pp. 234–240. Film coefficients of heat transfer have been determined for three petroleum and for water flowing through the horizontal double-pipe heat exchanger.

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RUBBER.—Activity of certain aryl-substituted biguanides as accelerators of vulcanisation. G. B. L. Smith and A. J. Weiss. *Ind. Eng. Chem.*, March 1, pp. 298–300. These compounds are accelerators of moderate activity. Alpha-*o*-tolylbiguanide has a fairly great activity in certain commercial rubber stocks.

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COLLOIDS.—The properties of "pure" cellulose as a colloid. P. P. von Weimarn. *Kolloid-Zeitschrift*, March, pp. 212–218.

The viscosity of colloids in the presence of electrolytes. N. R. Dhar, D. N. Chakravarti, and M. N. Chakravarti. *Kolloid-Zeitschrift*, March, pp. 225–233.

The preparation of colloid gold and platinum in phosphoric acids. F. Urbach and F. Blank. *Kolloid-Zeitschrift*, March, pp. 185–186.

GENERAL.—The thermal decomposition of complex cyanides of iron with regard to the catalytic synthesis of ammonia. A. Mittasch, E. Kuss, and O. Emert. *Zeitschrift anorganische Chem.*, Vol. 170, Part 3, March 20, pp. 193–213.

Contribution to the study of the reduction of sodium sulphate by carbon. P. P. Budnikoff and A. N. Sysojeff. *Zeitschrift anorganische Chem.*, Vol. 170, Part 3, March 20 pp. 225–232.

The X-ray interference effects of liquids as an expression of form and grouping of the molecule in the liquid state. J. R. Katz. *Zeitschrift angewandte Chem.*, March 31, pp. 329–340.

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Miscellaneous

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INORGANIC.—On the existence of the oxide of silver Ag_3O_4. A. P. Rollet. *Comptes Rendus*, March 19, pp. 748–750 (in French).

The yellow ferric hydroxide resulting from the careful oxidation of suspended ferrous sulphide. S. Veil. *Comptes Rendus*, March 19, pp. 753–755 (in French).

The introduction of bromide and iodine into silicates. A. Duboin. *Comptes Rendus*, March 19, pp. 762–764 (in French).

The composition of titanium peroxide. M. Billy. *Comptes Rendus*, March 19, pp. 760–762 (in French).

Perphosphates prepared by electrochemical means. F. Fichter and E. Gutzwiller. *Helvetica Chimica Acta*, Vol. XI, Part 2, pp. 323–337 (in German).

Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each.

Abstracts of Complete Specifications

286,749 and 287,001. ACCELERATORS FOR THE VULCANIZATION OF RUBBER. E. C. R. Marks, London. From The Rubber Service Laboratories Co., 335, South Main Street, Akron, Ohio, U.S.A. Application date, October 6, 1926.

Mercaptans or mercapto compounds carrying a CSH group are treated with an organic base other than a guanidine tending to decrease the acidity or increase the basicity, whereby the power of accelerating the vulcanization of rubber is increased. Suitable organic materials are the aldehyde-ammonia reaction products such as hexamethylene-tetramine in crystalline form or aqueous solution. Examples are also given of the use of triphenyl-biguanide, monophenyl biguanide, the guanyl ureas, isoureas, thioureas, and isothioureas. In addition to mercapto-benzo-thiazole, the aliphatic mercaptans, aromatic mercaptans, and substitution products may be used.

287,001. These accelerators for the vulcanization of rubber are obtained by combining the reaction product of a mercaptan or mercapto compound and an organic base with an aldehyde. In an example, mercapto-benzo-thiazole is combined with diortho-tolyl-guanidine and then treated with croton aldehyde, heptaldehyde, or other aldehydes.

286,796. ARALKYLATED UNSATURATED FATS AND FATTY ACIDS, AND THEIR SULPHONIC ACIDS, MANUFACTURE OF. W. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, December 13, 1926.

An aralkyl halogenide is treated with a free unsaturated fatty acid or fat in the presence of a heavy metal or metal compound, such as iron powder, zinc chloride, or aluminium chloride. Halogen acid is liberated above 100° C. and an oil is obtained soluble in dilute alkalies, ether, acetone, benzene, but insoluble in water. These fats or unsaturated fatty acids may be treated with sulphonating agents to obtain water-soluble sulphonic acids which have good wetting and solvent properties, and are applicable to dyeing and printing. The sulphonic acids can be employed as substitutes for turkey-red oil. Examples are given of the treatment of oleic acid and rape oil.

286,797. HALOGENATED ALCOHOLS, MANUFACTURE OF. I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany, and J. Callsen, 106, Marienstrasse, Elberfeld, Germany. Application date, December 13, 1926. Addition to 235,584.

Specification No. 235,584 (see THE CHEMICAL AGE, Vol. XIII, p. 176) describes the production of halogenated alcohols by treating the corresponding halogenated aldehyde dissolved in a primary alcohol with an alcoholate or halogenated alcoholate of aluminium, and in this invention the primary alcohol is replaced with a secondary alcohol. An example is given of the treatment of bromal dissolved in isopropyl alcohol with aluminium alcoholate, hydrogen being passed through the mixture to obtain tribromo-ethyl-alcohol.

286,808. NEW DERIVATIVES FROM LIGNINSULPHONIC ACID (SULPHITE CELLULOSE WASTE), MANUFACTURE OF. British Dyestuffs Corporation, Ltd., Hexagon House, Blackley, Manchester, and A. J. Hailwood, Crumpsall Vale Chemical Works, Blackley, Manchester. Application date, December 21, 1926.

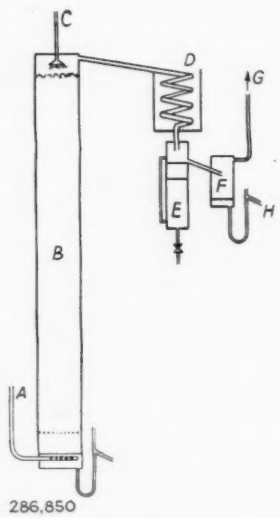
Ligninsulphonic acid is treated with ammonia under pressure to obtain new derivatives which retain the dispersion properties and are particularly suitable for addition to dispersed dye pastes which are to be dried to powder form. The products are also suitable as tanning agents, and their colour may be removed by alkaline reduction.

286,825. HYDROCARBONS FROM COAL, TARS, MINERAL OILS AND THE LIKE, PRODUCTION OF. J. Y. Johnson, From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, January 3, 1927.

Coal, tars, mineral oils, etc., in a state of fine division or vapour are subjected to the action of an electric arc in the presence of less than one half the quantity of water vapour which would be necessary for the production of water gas. If the starting material is liquid, the water vapour may be replaced by hydrogen, nitrogen, carbon dioxide, or carbon monoxide. If coal is used it may be in the form of fine dust or mixed with tar or oil, and the materials are preferably admitted to the electric arc in a heated condition, but the preheating is not carried to the extent of decomposition. Hard coal dust may be treated in this way to obtain about 50 litres of acetylene per kilogram of coal dust. A higher yield is obtained from coal tar.

286,850. ETHYLENE GLYCOL, MANUFACTURE OF. British Dyestuffs Corporation, Ltd., Hexagon House, Blackley, Manchester, K. H. Saunders, Crumpsall Vale Chemical Works, Blackley, Manchester, and H. Wignall, Dalton Works, Huddersfield. Application date, February 8, 1927.

The object is to obtain ethylene glycol in a continuous process by distillation of crude ethylene chlorhydrin solution followed by hydrolysis with alkali. Ethylene hclorhydrin is



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admitted at the top of a tower and steam at the bottom in exactly sufficient amount to volatilise and carry upwards the ethylene chlorhydrin. The steam and ethylene chlorhydrin pass through a fractionating column and the constitution of the vapour at the head of the fractionating column is such that, if condensed, a 40 per cent. solution of ethylene chlorhydrin would be obtained. The ethylene chlorhydrin vapour passes through a pipe A to the bottom of a second tower B where it bubbles through the accumulated hot liquid which may be heated by external burners. The ascending vapour and steam meet a down flowing solution of sodium carbonate admitted at C. The ethylene chlorhydrin is hydrolysed to the glycol, and steam, carbon dioxide, and volatile impurities pass to the condenser D. The ethylene glycol dissolves in the salt solution and collects at the bottom of the tower. The impurities are collected in a vessel E, where they separate into two layers, *oil below and water above. The water passes to a gas* separator F and carbon dioxide passes off at G. Caustic alkali may be substituted for the sodium carbonate, and the glycol is obtained in the form of its anhydride.

286,865 and 286,980. SULPHURIC ACID, MANUFACTURE OF. A. Sharp, 231, Strand, London, W.C.2. From Soc. Générale Métallurgique de Hoboken, Hoboken-les-Anvers, Belgium. Application dates, February 19 and August 23, 1927.

286,865. In processes for the manufacture of sulphuric acid, a variation of the heat conditions produces a considerable

change in the working of the process, particularly when cold gases of small and variable percentages of SO_2 are treated. The effect of these variations may be minimised by filling the reaction chambers with an acid-resisting packing material having a high heat capacity. The temperature in the chamber is maintained practically constant by varying the temperature of the acid circulating through it or the amount per unit of time. The apparatus is of such shape that it possesses a small radiating surface relatively to the volume, *e.g.*, a cube, or a cylinder having a diameter equal to its height.

286,980. In the manufacture of sulphuric acid from gases having a variable percentage of SO_2, or varying in quantity, the gases are first treated by any contact process, and then in towers filled with small pieces of an acid resisting packing material of high mechanical strength such as flint, over which passes a solution of nitrosyl-sulphuric acid in sulphuric acid.

286,984. Quaternary Ammonium Compounds from Halogen Substituted Tertiary Aromatic Amines, Process for the Manufacture of. W. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, December 10, 1926.

New quaternary ammonium compounds of the benzene and naphthalene series are obtained by the reaction of monomolecular proportions of a halogen-substituted dialkyl-arylamine and an alkyl ester of sulphuric or an aryl sulphonic acid, either directly or in a solvent such as toluene monochlor-benzene, etc. The new salts of trialkyl-aryl-ammonium bases substituted in the aryl nucleus by halogen are soluble in water and alcohol, and can be used as alkylating agents and as intermediates for the production of dyestuffs. Examples are given of the production of 3-chloro-1-methyl-benzene-4-trimethyl-ammonium *p*-toluol sulphonic acid salt, 1-chloronaphthalene-2-trimethyl-ammonium-sulpho-methyl ester salt, *o*-*p*-dichloro-phenyl-trimethyl-ammonium sulpho-methyl ester salt, and the sulpho-methyl ester salt of a methylated 3 : 3^1-dicholoro-4 : 4^1-tetra-methyl-diamino-diphenyl-methane.

287,020. Dyestuffs of the Anthanthrone Series, Manufacture of. L. Cassella and Co., G.m.b.H., Frankfort-on-Main, Germany. Application date, November 3, 1926. Addition to 260,998.

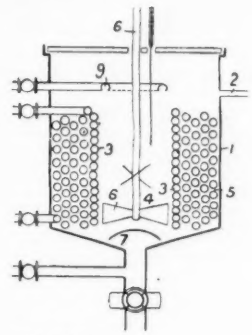
Specification No. 260,998 (see The Chemical Age, Vol. XVI, p. 69) describes the manufacture of dyestuffs of the anthanthrone series by treating anthanthrone in the presence of a solvent or diluent with a halogen or halogenating agent. In this invention, an excess of liquid halogen or halogenating agent is employed as diluent. The process can be carried out in the absence of a diluent with halogen or halogenating agent in the form of gas or vapour. The reaction can be accelerated by the addition of a suitable halogen carrier such as iodine, antimony pentachloride, ferric chloride, iodine trichloride, etc. Mixed chlorinating and brominating agents may be used.

Note.—Abstracts of the following specifications which are now accepted, appeared in The Chemical Age when they became open to inspection under the International Convention : 258,289 (I.G. Farbenindustrie Akt.-Ges.), relating to condensation products of urea and formaldehyde, see Vol. XV, p. 501 ; 261,400 (I.G. Farbenindustrie Akt.-Ges.), relating to condensation products of the anthracene series, see Vol. XVI, p. 91 ; 272,538 (I.G. Farbenindustrie Akt.-Ges.), relating to destructive hydrogenation of carbonaceous materials, see Vol. XVII, p. 173 ; 277,652 (International Cement Gun Co.), relating to drying and neutralising of ammonium salts, see Vol. XVII, p. 467.

International Specifications not yet Accepted

284,700-1-2. Nitrating Glycerine, etc. A. Schmid, 3, *Heumuhlgasse, Vienna*, and *J. Meissner, Kreis Siegen*, Burbach, Germany. (Assignees of Dynamit-Akt.-Ges. vorm. A. Nobel and Co., Hamburg, Germany.) International Convention date, February 5, 1927.

284,700. Glycerine, glycol, or the like is introduced through a pipe 9, and nitrating acid through openings 7 into the reaction vessel, and the mixture is circulated from chamber 4 to chamber 5 which contains cooling tubes 3. The mixture is circulated by a stirrer 6, and excess is drawn off at 2. The inner tubes 3 are sufficiently close together to form a partition.



284,700

284,701. Nitroglycerine is separated from the residual acid by running the mixture over inclined plates arranged in such a way that two layers are formed.

284,702 Nitroglycerine is washed free from acid by means of soda in a column containing perforated horizontal partitions. The mixture is circulated by compressed air.

284,998. 2 : 3-Aminonaphthoic Acid. I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, February 7, 1927.

2 : 3-oxynaphthoic acid is gradually introduced into fused zinc chloride-ammonia, or vice versa, and ammonia is passed over the mixture. Zinc chloride is then washed out with dilute cold hydrochloric acid, and the product extracted with hot hydrochloric acid. Caustic alkali is added and the solution boiled, cooled, and filtered, and the 2 : 3-aminonaphthoic acid precipitated by acidifying.

285,000. Tar and Tar Oil. F. C. Bunge and H. Macura, Mikolow, Poland. International Convention date, February 8, 1927.

Crude tar or distillate is treated with phosgene, boron trichloride, phosphorus oxychloride, phosphorus sulphochloride, silicon tetrachloride, chromyl chloride, sulphuryl chloride, or chloride of tin, antimony, arsenic, or bismuth. The product is distilled to remove hydrochloric acid and light hydrocarbons, and the residue employed as a lubricant.

285,001. Synthetic Drugs. Schering-Kahlbaum Akt.-Ges., 170, Müllerstrasse, Berlin. International Convention date, February 8, 1927. Addition to 270,729 (See The Chemical Age, Vol. XVII, p. 86).

The diazo compound of 2-nitraniline-4-sulphonic acid is treated with potassium thiocyanate, reduced, and gold is introduced into the thio group to obtain 3-amino-4-auromercaptobenzene-1-sulphonic acid ; this is treated with sodium formaldehyde bisulphite to obtain the formaldehyde bisulphite compound. Corresponding compounds of N-α (β^1-aminopyridyl)-4-amino-2-auromercaptobenzene-1-sulphonic acid and 3-amino-4-argentomercaptobenzene-1-sulphonic acid are obtained in a similar manner.

285,017. Phthalic Anhydride. Selden Co., 339, 2nd Avenue, Pittsburg, U.S.A. (Assignees of A. O. Jaeger, 9, Grandview Avenue, Crafton, Pa., U.S.A.) International Convention date, February 8, 1927.

Phthalic anhydride is obtained by vapour-phase oxidation of naphthalene in the presence of catalysts, and purified by condensation and polymerization of unsaturated components so that the impurities are converted into substances of much *higher boiling point than phthalic anhydride. Several methods* of effecting the purification are described, including heating and agitating at the boiling point of phthalic anhydride, distilling with a large reflux condenser packed with quartz, etc., bringing the vapour into contact with polymerisation catalysts such as aluminium oxide, halogenizing or oxidising the impurities. In an example, naphthalene vapour is oxidised with air in the presence of vanadium catalysts at 370°-420° C., and then heated gradually to 284·5° C. and boiled under a reflux condenser for 6 hours. The mixture is then fractionated and the anhydride condensed.

285,055. PHOSPHORUS. I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, February 10, 1927.

Raw phosphates, carbon, and material containing silica and alumina are heated together to produce phosphorus, phosphoric acid, and a slag having a composition similar to blast furnace slag, the charge being regulated for this purpose. The slag is ground with Portland cement clinker.

285,064. PURIFYING AND FRACTIONATING OILS AND KETONES. Akt.-Ges. für Kohlensäure-Industrie, 21, Schiffbauerdamm, Berlin, and E. B. Auerbach, 34, Tempelhofer Ufer, Berlin. International Convention date, February 12, 1927. Addition to 277,946.

Specification 277,946 (see THE CHEMICAL AGE, Vol. XVII, p. 495) describes the purification and fractionation of mineral oils by means of liquid carbondioxide. This process is now applied to mineral oils mixed with other substances and to fats and fatty oils, essential oils, resin oils, tar oils, terpenes and other liquid hydrocarons, and ketone oils.

285,071. RUBBER POLYMERS, OXIDES, HALIDES. Goodyer Tire and Rubber Co., 1144, East Market Street, Akron, Ohio, U.S.A. (Assignees of H. A. Bruson, 87, Kurlburt Avenue, Akron, Ohio, U.S.A.). International Convention date, February 11, 1927.

Rubber is treated with halides of which the positive element possesses secondary valencies, *e.g.*, tin tetrachloride, antimony pentachloride, titanium tetrachloride, ferric chloride, boron trichloride, etc., forming addition products, containing a number of hydrocarbon molecules linked together. A polymer of rubber can be precipitated with alcohol. It absorbs oxygen from the air.

285,080. TETRAZOLES. A. Boehringer, Nieder, Ingelheim-on-Rhine, Germany. International Convention date, February 11, 1927. Addition to 280,529. (See THE CHEMICAL AGE, Vol. XVIII, p. 57.)

Esters of oximes, particularly sulphonic esters, or Beckmann transformation products are treated with azides or free hydrazoic acid, or the esters are treated in the presence of hydrazoic acid with thionyl chloride or phosphorus oxy- or pentachloride which effect the transformation. Examples are given of the production of 1-benzyl-5-amino-1 : 2 : 3 : 4-tetrazole, and 1-phenyl-5-amino-1 : 2 : 3 : 4-tetrazole.

285,090. ACETIC ANHYDRIDE. I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, February 11, 1927.

A mixture of acetic anhydride and water vapour is treated in a separating column with a low-boiling indifferent solvent such as benzene, toluene, chloroform, trichlorethylene or ethylene chloride with or without a high-boiling solvent such as *o*-dichlorbenzene, quinoline, or quinaldine to reduce the vapour tension of the anhydride. The water vapour is thereby removed from the anhydride.

285,095. ESTERS OF VINYL ALCOHOL. Consortium für Elektro-chemische Industrie Ges., 20, Zielstattstrasse, Munich, Germany. International Convention date, February 12, 1927.

Esters of vinyl alcohol are obtained by passing a mixture of acetylene and the carboxylic acid over a heated catalyst, and the yield is increased and the life of the catalyst prolonged by passing the mixture rapidly so that more than half the mixture is unchanged. An example is given of the manufacture of vinyl acetate.

285,096. DYES. Soc. of Chemical Industry in Basle, Switzerland. International Convention date, February 12, 1927.

Dyestuffs for cellulose esters and ethers are obtained by condensing a 1-oxy- or 1-alkyloxy-4-aminoanthraquinone or a 1 : 4-diaminoanthraquinone with an aromatic diamine such as phenylene diamine, naphthylene diamine, or benzidine. The products are 1-arylamino-4-aminoanthraquinones which contain in the aryl nucleus at least one amino group or a group derived from the amino group. The dyes may be treated with sulphonating agents.

LATEST NOTIFICATIONS.

287,542. Process for developing photographic reversal films. I.G. Farbenindustrie Akt.-Ges. March 25, 1927.
287,479. Manufacture of azo-dyestuffs. I.G. Farbenindustrie Akt.-Ges. March 21, 1927.
287,553. Spinning of artificial threads. I.G. Farbenindustrie Akt.-Ges. March 24, 1927.
287,845. Manufacture of vat-dyestuffs of the pyrenequinone series. I.G. Farbenindustrie Akt.-Ges. March 26, 1927.
287,846. Process of manufacturing esters and other valuable organic compounds. Du Pont de Nemours and Co., E. I. March 26, 1927.
287,507. Process for extracting theobromine from natural products. Naamlooze Vennootschap Soc. voor Chemische Industrie Katwijk. March 22, 1927.
287,492. Process of purifying cellulose xanthate. I.G. Farbenindustrie Akt.-Ges. March 21, 1927.
287,855. Production of low boiling-point oils and other products by the destructive hydrogenation of coals, oils, and the like. I.G. Farbenindustrie Akt.-Ges. March 26, 1927.
287,858. Manufacture of substituted thioglycollic acids. I.G. Farbenindustrie Akt.-Ges. March 24, 1927.
287,862. Manufacture of artificial silk. I.G. Farbenindustrie Akt.-Ges. March 24, 1927.
288,127. Manufacture of acid- and lime-resisting derivatives of unsaturated fatty acids. I.G. Farbenindustrie Akt.-Ges. April 1, 1927.
288,133. Process for the manufacture of halogenated 2-pyridone and its derivatives. Schering-Kahlbaum Akt.-Ges. March 31, 1927.
288,171. Manufacture of highly chlorinated perylenes. Bensa, F. April 2, 1927.
287,924. Process for preparing tetrazoles. Boehringer, A. March 30, 1927.
288,143. Process for the working-up of cellulose ethers. I.G. Farbenindustrie Akt.-Ges. March 31, 1927.
287,908. Manufacture of azo-dyestuffs. I.G. Farbenindustrie Akt.-Ges. March 29, 1927.
287,880. Manufacture of cellulose esters. Kodak, Ltd. March 28, 1927.
288,148. Production of low-boiling point and other hydrocarbons and derivatives thereof by the destructive hydrogenation of coals, oils and the like. I.G. Farbenindustrie Akt.-Ges. March 31, 1927.
288,153. Manufacture of artificial silk. I.G. Farbenindustrie Akt.-Ges. April 1, 1927.
287,940. Process of coating articles. Du Pont de Nemours and Co., E. I. March 30, 1927.
287,941. Process for making tubercele waxes free from any tuberclebacilli and from tuberculin. I.G. Farbenindustrie Akt.-Ges. March 30, 1927.
288,159. Manufacture of condensation products of the benzodiazine series. I.G. Farbenindustrie Akt.-Ges. March 31, 1927.

Specifications Accepted with Date of Application

261,757. Condensation products and vat dyestuffs of the benzanthrone series, Manufacture of. I.G. Farbenindustrie Akt.-Ges. November 17, 1925. Addition to 249,891.
261,786. Synthesis, distillation, cracking, and hydrogenation of hydrocarbon oils. J. Trautmann. November 21, 1925.
263,179. Thiomorpholines of the anthraquinone series, Manufacture of. I.G. Farbenindustrie Akt.-Ges. December 17, 1925. Addition to 263,178.
263,198-9. Widely porous active silica, Production of. I.G. Farbenindustrie Akt.-Ges. December 19, 1925.
263,795. Acid dyestuffs of the anthraquinone series, Manufacture of. I.G. Farbenindustrie Akt.-Ges. December 23, 1925. Addition to 263,178 and 263,177.
263,861. Vat dyestuffs of the dibenzanthrone series, Manufacture of. I.G. Farbenindustrie Akt.-Ges. December 30, 1925. Addition to 218,255.
264,502. Grey to black dyestuffs, Manufacture and production of. I.G. Farbenindustrie Akt.-Ges. January 12, 1926.
269,133. Nickel or ferro-nickel, Process of obtaining. M. Stern. April 7, 1926.
265,553. Tetrakisazo dyes, and process of manufacture. Newport Co. February 6, 1926.
269,491. Complex fluorides, Process of producing. A. F. Meyerhofer. April 13, 1926.
274,048. Continuously transforming oxides into chlorides by exothermic reaction, Method of. A. L. Mond. (*I.G. Farbenindustrie Akt.-Ges.*) May 25, 1927.
275,220. Azo dyestuffs, Manufacture of. J. R. Geigy Akt.-Ges. July 29, 1926.
276,617. Butyric acid, Extraction of. Soc. des Brevets Etrangers Lefranc et Cie. August 27, 1926.
278,651. Vat dyestuffs, Manufacture and production of. I.G. Farbenindustrie Akt.-Ges. October 8, 1926.

279,511. Ammonia, Combustion of. H. Pauling. October 22, 1926.

279,774. Purification of liquid hydrocarbons by liquid sulphur dioxide in counter current, Process and apparatus for. Allgemeine Ges. für Chemische Industrie. November 1, 1926.

287,604. Citric acid, Production of. Distillers Co., Ltd., and A. M. Peake. November 27, 1926.

287,607. Purifying liquids by distillation, Processes for. E. C. R. Marks. (*U.S. Industrial Alcohol Co.*) November 29, 1926.

287,702. Iron oxide hydrate from iron metal, Method of producing. J. Wagner. March 8, 1927.

287,734. Beryllium, Production of. E. C. R. Marks. (*Kemet Laboratories Co., Inc.*) April 20, 1927.

287,745. Working up ores and metallurgical products of various kinds containing volatizable metals. F. Krupp Grusonwerk Akt.-Ges. May 24, 1927. Addition to 252,679.

287,762. Producing metals by electrolysis. E. C. R. Marks. (*Kemet Laboratories Co., Inc.*) April 20, 1927.

Applications for Patents

Aarts, C. J. G. Production of hydrocarbons. 9,249. March 27.

Ashcroft, E. A. Metallurgy of ores, etc. 10,298, 10,299, 10,300, 10,301, 10,302, 10,303, 10,304. April 5.

Baddiley, J., British Dyestuffs Corporation, Ltd., and Chapman, E. Wetting-out agents or emulsifiers for use in textile, etc., industries. 9,691. March 30.

Brown and Son (Alembic Works), Ltd. Laboratory apparatus. 9,846. April 2.

Celanese Corporation of America and Dreyfus, H. Manufacture of products from cellulose derivatives. 10,339. April 5.

Carpmael, A., and I.G. Farbenindustrie Akt.-Ges. Reduction of aromatic nitro compounds. 9,578. March 29.

Carpmael, A. Manufacture of condensation products from aldehydes and phenols. 9,720. March 30.

Carpmael, A., and I.G. Farbenindustrie Akt.-Ges. Manufacture of refined products from wool fat. 9,787. March 31.

Carpmael, A., and I.G. Farbenindustrie Akt.-Ges. Manufacture of bleached pure wool fat. 9,788. March 31.

Carpmael, A., and I.G. Farbenindustrie Akt.-Ges. Manufacture of resinous products. 9,789. March 31.

Carpmael, K. [legal representative of Carpmael, W.], Carpmael, K. S., and I.G. Farbenindustrie Akt.-Ges. Vat dyestuffs, etc. 9,722. March 30. (December 10, 1926.)

Chemical Works, formerly Sandoz, and Ellis, G. B. Manufacture of therapeutic calcium preparations. 9,263. March 27.

Coley, H. E. Manufacture of metallic nitrides and ammonia from nitrogen. 10,156. April 4.

Coley, H. E. Manufacture of zinc. 10,157. April 4.

Coley, H. E. Manufacture of cyanides from nitrogen. 10,158. April 4.

Coley, H. E. Manufacture of alloys. 10,159. April 4.

Coley, H. E. Manufacture of photographic plates and films. 10,160. April 4.

Coley, H. E. Manufacture of barium sulphide and hydroxide. 10,161. April 4.

Coley, H. E. Reduction of carbonates, etc. 10,162. April 4.

Coley, H. E. Reduction of sulphates. 10,163. April 4.

Coley, H. E. Manufacture of thorium, cerium, etc. 10,164. April 4.

Coley, H. E. Extraction of gold from arsenical ores. 10,165. April 4.

Consortium für Elektrochemische Industrie Ges. Manufacture of aldehyde. 10,195. April 4. (Germany, April 4, 1927.)

Consortium für Elektrochemische Industrie Ges. Manufacture of carboxylic acid anhydrides. 10,366. April 5. (Germany, April 11, 1927.)

Distillers Co., Ltd. Recovery of acetic acid. 9,947. April 2.

Dreyfus, H. Manufacture of aliphatic compounds. 9,243, 9,244. March 27.

Dreyfus, H. Manufacture of cellulose derivatives. 9,366, 9,367. March 28.

Du Pont de Nemours and Co., E. I., and Marks, E. C. R. Synthetic resins. 9,283. March 27.

Du Pont de Nemours and Co., E. I., and Nobel Industries, Ltd. Varnishes, etc. 9,569. March 29.

Du Pont de Nemours and Co., E. I. Coating articles. 9,689. March 30. (United States, March 30, 1927.)

Gilardi, P., and Kleiber, E. Production of synthetic rubber. 9,110. March 26.

Gordon, K., and Imperial Chemical Industries, Ltd. Manufacture of sulphuric acid and cement. 9,755. March 31.

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Manufacture of artificial rubber. 9,664. March 30.

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Fertilizers. 9,665. March 30.

I.G. Farbenindustrie Akt.-Ges. Production of low-boiling point oils, etc. 9,091. March 26. (Germany, March 26, 1927.)

I.G. Farbenindustrie Akt.-Ges. Manufacture of substituted thioglycollic acids. 9,119. March 26. (Germany, March 24, 1927.)

I.G. Farbenindustrie Akt.-Ges. Manufacture of artificial silk. 9,160. March 26. (Germany, March 24, 1927.)

I.G. Farbenindustrie Akt.-Ges. Manufacture of azo-dyestuffs. 9,315. March 27. (Germany, March 29, 1927.)

I.G. Farbenindustrie Akt.-Ges. Production of low boiling point hydrocarbons, etc. 9,388. March 28. (Germany, March 31, 1927.)

I.G. Farbenindustrie Akt.-Ges. Manufacture of azo dyestuffs. 9,425. March 28. (Germany, January 26.)

I.G. Farbenindustrie Akt.-Ges. Manufacture of artificial silk. 9,536. March 29. (Germany, April 1, 1927.)

I.G. Farbenindustrie Akt.-Ges. Preservation of latex. 9,663. March 30. (Germany, April 20, 1927.)

I.G. Farbenindustrie Akt.-Ges. Process for making tubercle-waxes. 9,702. March 30. (Germany, March 30, 1927.)

I.G. Farbenindustrie Akt.-Ges. Manufacture of condensation products of the benzodiazine series. 9,721. March 30. (Germany, March 31, 1927.)

I.G. Farbenindustrie Akt.-Ges. Manufacture of vat dyestuffs of anthanthrone series. 9,723. March 30. (Germany, April 9, 1927.)

I.G. Farbenindustrie Akt.-Ges. Manufacture of soluble cellulose esters of higher fatty acids. 9,795. March 31. (Germany, September 27, 1927.)

I.G. Farbenindustrie Akt.-Ges and Johnson, J. Y. Coloured gelatinous masses. 9,885. April 2.

I.G. Farbenindustrie Akt.-Ges and Johnson, J. Y. Preservation and treatment of latex. 9,887. April 2.

I.G. Farbenindustrie Akt.-Ges and Johnson, J. Y. Production of antirachitic products. 9,888. April 2.

I.G. Farbenindustrie Akt.-Ges and Johnson, J. Y. Manufacture of pure iron. 9,889. April 2.

I.G. Farbenindustrie Akt.-Ges and Imray, O. Y. Photographic desensitizers. 10,032. April 3.

I.G. Farbenindustrie Akt.-Ges and Johnson, J. Y. Production of gases. 10,184. April 4.

I.G. Farbenindustrie Akt.-Ges and Johnson, J. Y. Manufacture of dielectrics and waterproof materials. 10,185. April 4.

I.G. Farbenindustrie Akt.-Ges and Johnson, J. Y. Production of wax compositions. 10,186. April 4.

I.G. Farbenindustrie Akt.-Ges and Johnson, J. Y. Production of gases from bituminous coals, etc. 10,349. April 5.

I.G. Farbenindustrie Akt.-Ges and Johnson, J. Y. Manufacture of light bricks. 10,350. April 5.

I.G. Farbenindustrie Akt.-Ges. Vulcanisation of latex. 9,886. April 2. (Germany, April 4, 1927.)

I.G. Farbenindustrie Akt.-Ges. Accumulator plates. 9,903. April 2. (Germany, May 9, 1927.)

I.G. Farbenindustrie Akt.-Ges. Production of electrolytic iron. 9,908. April 2. (Germany, July 8, 1927.)

I.G. Farbenindustrie Akt.-Ges. Manufacture of aromatic N-amino-alkylamino aldehydes, etc. 10,035. April 3. (Germany, April 16, 1927.)

I.G. Farbenindustrie Akt.-Ges. Refining chromium ores. 10,036. April 3. (Germany, April 16, 1927.)

I.G. Farbenindustrie Akt.-Ges. Manufacture of dyestuffs. 10,196, 10,197. April 4. (Germany, April 4, 1927.)

I.G. Farbenindustrie Akt.-Ges. Manufacture of copper ammine complex azo compounds. 10,205. April 4. (Germany, April 6, 1927.)

I.G. Farbenindustrie Akt.Ges. Manufacture of phenol. 10,206. April 4. (Germany, April 6, 1927.)

I.G. Farbenindustrie Akt.Ges. Production of magnesia and calcium nitrate from dolomite. 10,252. April 4. (Germany, May 9, 1927.)

Imperial Chemical Industries, Ltd. Explosives. 10,059. April 3.

Imperial Chemical Industries, Ltd. Manufacture of products from oils. 10,446. April 5.

Imperial Chemical Industries, Ltd. Production of granular fertilizers. 9,756. March 31.

Lempke, F. E. Explosives. 10,077. April 3.

McEntlegart, J. M. Explosives. 10,059. April 3.

Oka, K. Process for removing iron from complex salt of sodium glutamate. 9,950. April 2. (Japan, May 19, 1927.)

Ormandy, W. R. Recovery of acetic acid. 9,947. April 2.

Schering-Kahlbaum Akt.-Ges. Manufacture of hydroxypyridine compounds. 10,037. April 3. (Germany, April 14, 1927.)

Schering-Kahlbaum Akt.-Ges. Manufacture of halogen derivatives of pyridine. 10,038. April 3. (Germany, April 14, 1927.)

Searle and Co., D. E. Manufacture of bismuth tartrates. 9,956. April 2.

Silica Gel Corporation. Manufacture of silica, etc., gels. 9,712. March 30.

Soc. of Chemical Industry in Basle. Dyeing compact vegetable material with dyestuffs. 10,198. April 4. (Switzerland, April 9, 1927.)

Technical Research Works, Ltd. Hydrogenation of organic compounds. 9,760. March 31.

Tootal, S. M. Dyes. 10,268. April 5.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

ACID ACETIC, 40% TECH.—£19 per ton.

ACID BORIC, COMMERCIAL.—Crystal, £30 per ton; powder, £32 per ton; extra fine powder, £34 per ton.

ACID HYDROCHLORIC.—3s. 9d. to 6s. per carboy d/d, according to purity strength, and locality.

ACID NITRIC, 80° Tw.—£21 10s. to £27 per ton, makers' works, according to district and quality.

ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations; 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

AMMONIA ALKALI.—£6 15s. per ton f.o.r. Special terms for contracts

BISULPHITE OF LIME.—£7 10s. per ton, f.o.r. London, packages extra

BLEACHING POWDER.—Spot, £9 10s. per ton d/d; Contract, £8 10s. per ton d/d, 4-ton lots.

BORAX, COMMERCIAL.—Crystals, £19 10s. to £20 per ton; granulated, £19 per ton; powder, £21 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)

CALCIUM CHLORIDE (SOLID).—£5 to £5 5s. per ton d/d carr. paid.

COPPER SULPHATE.—£25 to £25 10s. per ton.

METHYLATED SPIRIT 61 O.P.—Industrial, 1s. 6d. to 1s. 11d. per gall.; pyridinised industrial, 1s. 8d. to 2s. 1d. per gall.; mineralised, 2s. 7d. to 2s. 11d. per gall.; 64 O.P., 1d. extra in all cases.

NICKEL SULPHATE.—£38 per ton d/d.

NICKEL AMMONIA SULPHATE.—£38 per ton d/d.

POTASH CAUSTIC.—£30 to £33 per ton.

POTASSIUM BICHROMATE.—4½d. per lb.

POTASSIUM CHLORATE.—3¾d. per lb., ex wharf, London, in cwt. kegs.

SALAMMONIAC.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton, carr. paid.

SALT CAKE.—£3 15s. to £4 per ton d/d. In bulk.

SODA CAUSTIC, SOLID.—Spot lots delivered, £15 2s. 6d. to £18 per ton, according to strength; 20s. less for contracts.

SODA CRYSTALS.—£5 to £5 5s. per ton, ex railway depots or ports.

SODIUM ACETATE 97/98%.—£21 per ton.

SODIUM BICARBONATE.—£10 10s. per ton, carr. paid.

SODIUM BICHROMATE.—3½d. per lb.

SODIUM BISULPHITE POWDER, 60/62%.—£17 10s. per ton delivered for home market, 1-cwt. drums included; £15 10s. f.o.r. London.

SODIUM CHLORATE.—2¾d. per lb.

SODIUM NITRITE, 100% BASIS.—£27 per ton d/d.

SODIUM PHOSPHATE.—£14 per ton, f.o.b. London, casks free.

SODIUM SULPHATE (GLAUBER SALTS).—£3 12s. 6d. per ton.

SODIUM SULPHIDE CONC. SOLID, 60/65.—£13 5s. per ton d/d. Contract, £13. Carr. paid.

SODIUM SULPHIDE CRYSTALS.—Spot, £8 12s. 6d. per ton d/d. Contract, £8 10s. Carr. paid.

SODIUM SULPHITE, PEA CRYSTALS.—£14 per ton f.o.b. London, 1-cwt. kegs included.

Coal Tar Products

ACID CARBOLIC CRYSTALS.—6¼d. to 7¾d. per lb. Crude 60's, 2s. 3d. to 2s. 4d. per gall. prompt.

ACID CRESYLIC 99/100.—3s. per gall. 97/99.—2s. 7d. to 2s. 10d. per gall. Pale, 95%, 2s. 5d. to 2s. 7½d. per gall. Dark, 95%, 2s. 2d. to 2s. 4d.

ANTHRACENE.—A quality, 2½d. per unit. 40%, £5 per ton.

ANTHRACENE OIL, STRAINED.—8d. to 8½d. per gall. Unstrained, 7¾d. to 8d. per gall.

BENZOLE.—Prices at works; Crude, 8d. to 8½d. per gall.; Standard Motor, 1s. 0½d. to 1s. 1d. per gall.; 90%, 1s. 1½d. to 1s. 2d. per gall.; Pure, 1s. 5d. to 1s. 6d. per gall.

TOLUOLE.—90%, 1s. 4d. to 1s. 8d. per gall. Firm. Pure, 1s. 6d. to 1s. 7d. per gall.

XYLOL.—1s. 3d. to 2s. per gall. Pure, 2s. 4d. per gall.

CREOSOTE.—Cresylic, 20/24%, 10d. to 11d. per gall.; middle oil, 7⅞d. to 8¼d. per gall. Heavy, 8¾d. to 8¾d. per gall. Standard specification, 7½d. to 7⅝d. ex works. Salty, 7½d. per gall.

NAPHTHA.—Crude, 7½d. to 8d. per gall. Solvent 90/160, 9d. to 10½d. per gall. Solvent 95/160, 1s. 3d. to 1s. 4d. per gall. Solvent 90/190, 9½d. to 1s. 2d. per gall.

NAPHTHALENE CRUDE.—Drained Creosote Salts, £5 per ton. Whizzed, £8 per ton. Hot pressed, £8 10s. to £9 per ton.

NAPHTHALENE.—Crystals, £13 to £14 10s. per ton. Quiet. Flaked, £14 to £15 per ton, according to districts.

PITCH.—Medium soft, 60s. to 70s. per ton, f.o.b., according to district. Nominal.

PYRIDINE.—90/140, 5s. 6d. to 7s. per gall. 90/180, 3s. to 5s. per gall. Heavy, 2s. 6d. to 3s. per gall.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated:

ACID AMIDONAPHTHOL DISULPHO (1-8-2-4).—10s. 9d. per lb.

ACID ANTHRANILIC.—6s. per lb. 100%.

ACID BENZOIC.—1s. 8½d. per lb.

ACID GAMMA.—4s. 6d. per lb.

ACID H.—3s. per lb.

ACID NAPHTHIONIC.—1s. 6d. per lb.

ACID NEVILLE AND WINTHER.—4s. 9d. per lb.

ACID SULPHANILIC.—8½d. per lb.

ANILINE OIL.—8d. per lb. naked at works.

ANILINE SALTS.—8d. per lb. naked at works.

BENZALDEHYDE.—2s. 3d. per lb.

BENZIDINE BASE.—3s. 3d. per lb. 100% basis d/d.

BENZOIC ACID.—1s. 8½d. per lb.

o-CRESOL 29/31° C.—5½d. per lb.

m-CRESOL 98/100%.—2s. 3d. to 2s. 6d. per lb.

p-CRESOL 32/34° C.—2s. 3d. to 2s. 6d. per lb.

DICHLORANILINE.—2s. per lb.

DIMETHYLANILINE.—1s. 11d. per lb.

DINITROBENZENE.—8½d. per lb. naked at works. £75 per ton.

DINITROCHLORBENZENE.—£84 per ton d/d.

DINITROTOLUENE.—48/50° C. 8d. per lb. naked at works. 66/68° C. 9d. per lb. naked at works.

DIPHENYLAMINE.—2s. 10d. per lb. d/d.

a-NAPHTHOL.—2s. per lb. d/d.

B-NAPHTHOL.—10d. per lb. d/d.

a-NAPHTHYLAMINE.—1s. 3d. per lb.

B-NAPHTHYLAMINE.—3s. per lb.

o-NITRANILINE.—5s. 9d. per lb.

m-NITRANILINE.—3s. per lb. d/d.

p-NITRANILINE.—1s. 8d. per lb.

NITROBENZENE.—6d. per lb. naked at works.

NITRONAPHTHALENE.—1s. 3d. per lb.

R. SALT.—2s. 2d. per lb.

SODIUM NAPHTHIONATE.—1s. 8½d. per lb. 100% basis d/d.

o-TOLUIDINE.—8d. per lb.

p-TOLUIDINE.—2s. 1½d. per lb. naked at works.

m-XYLIDINE ACETATE.—2s. 6d. per lb. 100%.

N. W. ACID.—4s. 9d. per lb. 100%.

Wood Distillation Products

ACETATE OF LIME.—Brown, £10 5s. per ton. Good demand. Grey, £14 10s. to £15 per ton. Liquor, 9d. per gall.

CHARCOAL.—£6 to £9 per ton, according to grade and locality. Foreign competition severe.

IRON LIQUOR.—1s. 3d. per gall, 32° Tw. 1s. per gall. 24° Tw.

RED LIQUOR.—9d. to 10d. per gall.

WOOD CREOSOTE.—1s. 9d. per gall. Unrefined.

WOOD NAPHTHA, MISCIBLE.—3s. 11d. to 4s. 3d. per gall. Solvent, 4s. 3d. per gall.

WOOD TAR.—£4 to £5 per ton.

BROWN SUGAR OF LEAD.—£40 15s. per ton.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6½d. to 1s. 5½d. per lb., according to quality; Crimson, 1s. 4d. to 1s. 6d. per lb., according to quality.

ARSENIC SULPHIDE, YELLOW.—1s. 9d. per lb.

BARYTES.—£3 10s. to £6 15s. per ton, according to quality.

CADMIUM SULPHIDE.—2s. 6d. to 2s. 9d. per lb.

CARBON BISULPHIDE.—£20 to £25 per ton, according to quantity.

CARBON BLACK.—5½d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£45 to £50 per ton, according to quantity. drums extra.

CHROMIUM OXIDE, GREEN.—1s. 1d. per lb.

DIPHENYLGUANIDINE.—3s. 9d. per lb.

INDIARUBBER SUBSTITUTES, WHITE AND DARK.—5¾d. to 6¾d. per lb.

LAMP BLACK.—£35 per ton, barrels free.

LEAD HYPOSULPHITE.—9d. per lb.

LITHOPHONE, 30%.—£22 10s. per ton.

MINERAL RUBBER "RUBPRON."—£13 12s. 6d. per ton, f.o.r. London.

SULPHUR.—£9 to £11 per ton, according to quality.

SULPHUR CHLORIDE.—4d. to 7d. per lb., carboys extra.

SULPHUR PRECIP. B.P.—£47 10s. to £50 per ton.

THIOCARBAMIDE.—2s. 6d. to 2s. 9d. per lb., carriage paid.

THIOCARBANILIDE.—2s. 1d. to 2s. 3d. per lb.

VERMILION, PALE OR DEEP.—6s. to 6s. 3d. per lb.

ZINC SULPHIDE.—1s. per lb.

Pharmaceutical and Photographic Chemicals

ACID, ACETIC, PURE, 80%.—£39 per ton ex wharf London in glass containers.

ACID, ACETYL SALICYLIC.—2s. 5d. to 2s. 6d. per lb.

ACID, BENZOIC, B.P.—2s. to 3s. 3d. per lb., according to quantity. Solely ex Gum, 1s. 3d. to 1s. 6d. per oz., according to quantity.

ACID, BORIC B.P.—Crystal, 36s. to 39s. per cwt.; powder, 40s. to 43s. per cwt.; extra fine powder, 42s. per cwt., according to quantity. Carriage paid any station in Great Britain, in ton lots.
ACID, CAMPHORIC.—19s. to 21s. per lb.
ACID, CITRIC.—2s. 1d. to 2s. 2d. per lb. Less 5%.
ACID, GALLIC.—2s. 8d. per lb. for pure crystal, in cwt. lots.
ACID, PYROGALLIC, CRYSTALS.—7s. 3d. per lb. Resublimed, 8s. 3d. per lb.
ACID, SALICYLIC, B.P. PULV.—1s. 2d. to 1s. 3½d. per lb. Technical.—10½d. to 11½d. per lb.
ACID, TANNIC B.P.—2s. 8d. to 2s. 10d. per lb.
ACID, TARTARIC.—1s. 4½d. per lb., less 5%.
ACETANILIDE.—1s. 5d. to 1s. 8d. per lb. for quantities.
AMIDOL.—7s. 6d. to 9s. per lb., d/d.
AMIDOPYRIN.—8s. to 8s. 3d. per lb.
AMMONIUM BENZOATE.—3s. 3d. to 3s. 6d. per lb., according to quantity. 18s. per lb. ex Gum.
AMMONIUM CARBONATE B.P.—£37 per ton. Powder, £39 per ton in 5 cwt. casks. Resublimated, 1s. per lb.
ATROPINE SULPHATE.—9s. per oz.
BARBITONE.—5s. 9d. to 6s. per lb.
BENZONAPHTHOL.—3s. 3d. per lb. spot.
BISMUTH CARBONATE.—11s. 4d. to 11s. 7d. per lb.
BISMUTH CITRATE.—10s. 4d. to 10s. 7d. per lb.
BISMUTH SALICYLATE.—10s. 7d. to 10s. 10d. per lb.
BISMUTH SUBNITRATE.—9s. 7d. to 9s. 10d. per lb.
BISMUTH NITRATE.—6s. 7d. to 6s. 10d. per lb.
BISMUTH OXIDE.—14s. 7d. to 14s. 10d. per lb.
BISMUTH SUBCHLORIDE.—14s. 4d. to 14s. 7d. per lb.
BISMUTH SUBGALLATE.—8s. 7d. to 8s. 10d. per lb. Extra and reduced prices for smaller and larger quantities of all bismuth salts respectively.
BISMUTHI ET AMMON LIQUOR.—Cit. B.P. in W. Qts. 1s. 1½d. per lb.; 12 W. Qts. 1s. 0½d. per lb.; 36 W. Qts., 1s. per lb.
BORAX B.P.—Crystal, 24s. to 27s. per cwt.; powder, 25s. to 28s. per cwt., according to quantity. Carriage paid any station in Great Britain, in ton lots.
BROMIDES.—Ammonium, 2s. to 2s. 1d. per lb.; potassium, 1s. 8¾d. to 1s. 9¾d. per lb.; sodium, 1s. 11d. to 2s. per lb.; granulated ½d. per lb. less; all spot. Large quantities at lower rates.
CALCIUM LACTATE.—1s. 2½d. to 1s. 3½d. per lb.
CAMPHOR.—Refined flowers, 2s. 11d. to 3s. per lb., according to quantity; also special contract prices.
CHLORAL HYDRATE.—3s. 2d. to 3s. 4d. per lb.
CHLOROFORM.—2s. 3d. to 2s. 7½d. per lb., according to quantity.
CREOSOTE CARBONATE.—6s. per lb.
ETHERS.—S.G. '730—11½d. to 1s. 0½d. per lb., according to quantity; other gravities at proportionate prices.
FORMALDEHYDE.—£39 per ton, in barrels ex wharf.
GUAIACOL CARBONATE.—4s. 9d. to 5s. per lb.
HEXAMINE.—2s. 3d. to 2s. 6d. per lb.
HOMATROPINE HYDROBROMIDE.—30s. per oz.
HYDRASTINE HYDROCHLORIDE.—English make offered at 120s. per oz.
HYDROGEN PEROXIDE (12 VOLS.).—1s. 4d. per gallon, f.o.r. makers' works, naked. Winchesters, 2s. 11d. per gall. B.P., 10 vols., 2s. to 2s. 3d. per gall.; 20 vols., 4s. per gall.
HYDROQUINONE.—3s. 9d. to 4s. per lb., in cwt. lots.
HYPOPHOSPHITES.—Calcium, 3s. 6d. per lb., for 28 lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.
IRON AMMONIUM CITRATE.—B.P., 2s. 5d. to 2s. 8d. per lb. Green, 2s. 8d. to 3s. 1d. per lb.; U.S.P., 2s. 6d. to 2s. 9d. per lb.
IRON PERCHLORIDE.—18s. to 20s. per cwt., according to quantity.
IRON QUININE CITRATE.—B.P., 8¾d. to 9¼d. per oz.
MAGNESIUM CARBONATE.—Light commercial, £31 per ton net.
MAGNESIUM OXIDE.—Light commercial, £62 10s. per ton, less 2½%; Heavy commercial, £21 per ton, less 2½%; in quantity lower; Heavy Pure, 2s. to 2s. 3d. per lb., in 1 cwt. lots.
MENTHOL.—A.B.R. recrystallised B.P., 17s. per lb. net for January delivery; Synthetic, 9s. to 10s. per lb.; Synthetic detached crystals, 9s. to 12s. 6d. per lb., according to quantity; Liquid (95%), 9s. 6d. per lb.
MERCURIALS B.P.—Up to 1 cwt lots, Red Oxide, 7s. 6d. to 7s. 7d. per lb., levig., 7s. to 7s. 1d. per lb.; Corrosive Sublimate, Lump, 5s. 9d. to 5s. 10d. per lb., Powder, 5s. 2d. to 5s. 3d. per lb.; White Precipitate, Lump, 5s. 11d. to 6s. per lb., Powder, 6s. to 6s. 1d. per lb., Extra Fine, 6s. 1d. to 6s. 2d. per lb.; Calomel, 6s. 4d. to 6s. 5d. per lb.; Yellow Oxide, 6s. 10d. to 6s. 11d. per lb.; Persulph., B.P.C., 6s. 1d. to 6s. 2d. per lb.; Sulph. nig., 5s. 10s. to 5s. 11d. per lb. Special prices for larger quantities.
METHYL SALICYLATE.—1s. 5d. to 1s. 9d. per lb.
METHYL SULPHONAL.—9s. to 9s. 3d. per lb.
METOL.—9s. to 11s. 6d. per lb. British make.
PARAFORMALDEHYDE.—1s. 9d. per lb. for 100% powder.
PARALDEHYDE.—1s. 1d. to 1s. 4d. per lb.
PHENACETIN.—2s. 6d. to 2s. 9d. per lb.
PHENAZONE.—4s. to 4s. 3d. per lb.
PHENOLPHTHALEIN.—6s to 6s. 3d. per lb.
POTASSIUM BITARTRATE 99/100% (Cream of Tartar).—102s. per cwt., less 2½ per cent.
POTASSIUM CITRATE.—B.P.C., 2s. 5d. to 2s. 6d. per lb.; U.S.P., 2s. 3d. to 2s. 6d. per lb.
POTASSIUM FERRICYANIDE.—1s. 9d. per lb., in cwt. lots.
POTASSIUM IODIDE.—16s. 8d. to 17s. 2d. per lb., according to quantity.
POTASSIUM METABISULPHITE.—6d. per lb., 1-cwt. kegs included, f.o.r. London.
POTASSIUM PERMANGANATE.—B.P. crystals, 5½d. per lb., spot.
QUININE SULPHATE.—1s. 8d. to 1s. 9d. per oz., bulk in 100 oz. tins.
RESORCIN.—2s. 10d. to 3s. per lb., spot.
SACCHARIN.—55s. per lb.; in quantity lower.
SALOL.—2s. 4d. per lb.
SODIUM BENZOATE, B.P.—1s. 8d. to 1s. 11d. per lb.
SODIUM CITRATE, B.P.C., 1911.—2s. to 2s. 3d. per lb., B.P.C., 1923—2s. 4d. to 2s. 5d. per lb. U.S.P., 2s. 3d. to 2s. 6d. per lb., according to quantity.
SODIUM FERROCYANIDE.—4d. per lb., carriage paid.
SODIUM HYPOSULPHITE, PHOTOGRAPHIC.—£15 per ton, d/d consignee's station in 1-cwt. kegs.
SODIUM NITROPRUSSIDE.—16s. per lb.
SODIUM POTASSIUM TARTRATE (ROCHELLE SALT).—90s. to 95s. per cwt. Crystals, 5s. per cwt. extra.
SODIUM SALICYLATE.—Powder, 1s. 7d. to 1s. 9d. per lb. Crystal, 1s. 7½d. to 1s. 10d. per lb.
SODIUM SULPHIDE, PURE RECRYSTALLISED.—10d. to 1s. 1d. per lb.
SODIUM SULPHITE, ANHYDROUS.—£27 10s. to £28 10s. per ton, according to quantity. Delivered U.K.
SULPHONAL.—6s. 9d. to 7s. per lb.
TARTAR EMETIC, B.P.—Crystal or powder, 2s. 1d. to 2s. 3d. per lb.
THYMOL.—Puriss., 9s. 6d. to 9s. 9d. per lb., according to quantity. Firmer. Natural, 14s. 3d. per lb.

Perfumery Chemicals

ACETOPHENONE.—7s. per lb.
AUBEPINE (EX ANETHOL).—11s. per lb.
AMYL ACETATE.—2s. 6d. per lb.
AMYL BUTYRATE.—4s. 9d. per lb.
AMYL SALICYLATE.—2s. 9d. per lb.
ANETHOL (M.P. 21/22° C.).—5s. 6d. per lb.
BENZYL ACETATE FROM CHLORINE-FREE BENZYL ALCOHOL.—2s. per lb.
BENZYL ALCOHOL FREE FROM CHLORINE.—2s. per lb.
BENZALDEHYDE FREE FROM CHLORINE.—2s. 6d. per lb.
BENZYL BENZOATE.—2s. 6d. per lb.
CINNAMIC ALDEHYDE NATURAL.—15s. 6d. per lb.
COUMARIN.—9s. 9d. per lb.
CITRONELLOL.—13s. 6d. per lb.
CITRAL.—8s. 3d. per lb.
ETHYL CINNAMATE.—6s. per lb.
ETHYL PHTHALATE.—2s. 9d. per lb.
EUGENOL.—8s. 3d. per lb.
GERANIOL (PALMAROSA).—20s. per lb.
GERANIOL.—6s. to 10s. per lb.
HELIOTROPINE.—4s. 9d. per lb.
ISO EUGENOL.—13s. per lb.
LINALOL.—Ex Bois de Rose, 15s. per lb. Ex Shui Oil, 10s. 6d. per lb.
LINALYL ACETATE.—Ex Shui Oil, 14s. 6d. per lb. Ex Bois de Rose, 18s. 6d. per lb.
METHYL ANTHRANILATE.—8s. 6d. per lb.
METHYL BENZOATE.—4s. per lb.
MUSK KETONE.—35s. per lb.
MUSK XYLOL.—7s. per lb.
NEROLIN.—3s. 9d. per lb.
PHENYL ETHYL ACETATE.—11s. per lb.
PHENYL ETHYL ALCOHOL.—10s. 6d. per lb.
RHODINOL.—35s. per lb.
SAFROL.—1s. 6d. per lb.
TERPINEOL.—1s. 6d. per lb.
VANILLIN.—15s. 3d. to 16s. 6d. per lb.

Essential Oils

ALMOND OIL.—Foreign S.P.A., 10s. 6d. per lb.
ANISE OIL.—2s. 9d. per lb.
BERGAMOT OIL.—24s. per lb.
BOURBON GERANIUM OIL.—15s. per lb.
CAMPHOR OIL.—9d. per lb.
CANANGA OIL, JAVA.—12s. 9d. per lb.
CINNAMON OIL LEAF.—6s. 9d. per oz.
CASSIA OIL, 80/85%.—8s. 3d. per lb.
CITRONELLA OIL.—Java, 1s. 10d. per lb., c.i.f. U.K. port. Ceylon, pure, 1s. 9d. per lb.
CLOVE OIL.—5s. 6d. per lb.
EUCALYPTUS OIL, AUSTRALIAN.—2s. 1d. per lb.
LAVENDER OIL.—Mont Blanc, 38/40%, Esters, 16s. per lb.
LEMON OIL.—9s. 6d. per lb.
LEMONGRASS OIL.—4s. 3d. per lb.
ORANGE OIL, SWEET.—13s. per lb.
OTTO OF ROSE OIL.—Anatolian, 35s. per oz. Bulgarian, 62s. 6d. per oz.
PALMA ROSA OIL.—12s. 6d. per lb.
PEPPERMINT OIL.—Wayne County, 15s. 9d. per lb.; Japanese, 7s. 3d. per lb.
PETITGRAIN.—7s. 3d. per lb. Sandalwood, Mysore, 26s. 6d. per lb., 90/95%, 16s. 6d. per lb.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

Glasgow, April 11, 1928.

THE Easter holidays intervening since our last report, there has been little movement in the heavy chemical market, and there are no changes in prices of any importance to record.

Industrial Chemicals

ACETONE, B.G.S.—£64 to £67 per ton, ex store, according to quantity.

ACID ACETATE.—98/100%, glacial £56 to £67 per ton, according to quality and packing, c.i.f. U.K. ports; 80% pure £37 10s. per ton, ex wharf; 80% technical £37 10s. per ton, ex wharf.

ACID BORIC.—Crystals, granulated or small flakes, £30 per ton. Powdered £32 per ton, packed in bags, carriage paid U.K. stations.

ACID CARBOLIC, ICE CRYSTALS.—Quoted 6¼d. per lb., f.o.b. U.K. ports.

ACID CITRIC, B.P.—Quoted 1s. 11¾d. per lb., less 5%, ex store, spot delivery. Rather cheaper to come forward.

ACID HYDROCHLORIC.—Usual steady demand. Arsenical quality, 4s. per carboy. Dearsenicated quality 5s. 6d. per carboy, ex works, full wagon loads.

ACID NITRIC.—80° quality, £24 10s. per ton, ex station, full truck loads.

ACID OXALIC, 98/100%.—On offer from the Continent at 3¼d. per lb., ex wharf. Spot material quoted 3½d. per lb., ex store. In better demand.

ACID SULPHURIC.—£2 15s. per ton, ex works, for 144° quality; £5 15s. per ton for 168° quality. Dearsenicated quality 20s. per ton extra.

ACID TARTARIC, B.P. CRYSTALS.—Nominally 1s. 4¼d. per lb., less 5%, ex wharf, but demand not so great and some spot parcels could probably be obtained for less.

ALUMINA SULPHATE, 17/18%, IRON FREE.—Quoted £5 10s. per ton, c.i.f. U.K. ports, prompt shipment. Spot material available at about £5 15s. per ton, ex store.

ALUM, LUMP POTASH.—Spot material available at about £9 per ton, ex store. Crystal meal quoted £8 10s. per ton, ex store. Lump quality on offer from the Continent at £8 5s. per ton, c.i.f. U.K. ports.

AMMONIA, ANHYDROUS.—Unchanged at about 9d. per lb., carriage paid. Containers extra and returnable.

AMMONIA CARBONATE.—Lump £37 per ton; powdered £39 per ton, packed in 5 cwt. casks, delivered or f.o.b. U.K. ports.

AMMONIA LIQUID, 880°.—Unchanged at about 2¼d. to 3d. per lb., delivered, according to quantity.

AMMONIA MURIATE.—Grey galvanisers' crystals of British manufacture unchanged at £23 to £24 per ton, ex station. Continental on offer £19 15s. per ton, c.i.f. U.K. ports. Fine white crystals quoted £17 10s. per ton, c.i.f. U.K. ports.

ARSENIC, WHITE POWDERED.—Quoted £19 7s. 6d. per ton, ex wharf, prompt despatch from mines. Spot material available at £20 5s. per ton, ex store.

BARIUM CARBONATE, 98/100%.—English material on offer at £7 5s. per ton, ex store. Continental quoted £7 per ton, c.i.f. U.K. ports.

BARIUM CHLORIDE, 98/100%.—Large white crystals quoted £6 17s. 6d. per ton, c.i.f. U.K. ports.

BLEACHING POWDER.—British manufacturers' contract price to consumers £6 12s. 6d. per ton, delivered minimum four-ton lots. Continental on offer at £6 10s. per ton, ex wharf.

CALCIUM CHLORIDE.—British manufacturers' price £4 5s. to £4 15s. per ton, according to quantity and point of delivery. Continental material on offer at £3 12s. 6d. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—Unchanged at about £3 10s. per ton, f.o.r. works or £4 12s. 6d. per ton, f.o.b. U.K. ports for export.

COPPER SULPHATE.—Continental price unchanged at about £25 per ton, c.i.f. U.K. ports. Some British material available at about £25 per ton, ex store.

FORMALDEHYDE, 40%.—Offered at £35 10s. per ton, c.i.f. U.K. ports. Spot material quoted £39 per ton, ex store.

GLAUBER SALTS.—English material unchanged at £4 per ton, ex store or station. Continental quoted at £2 15s. per ton, c.i.f. U.K. ports.

LEAD, RED.—Imported material on offer at £31 per ton, ex store.

LEAD, WHITE.—Quoted £31 10s. per ton, ex store.

LEAD ACETATE.—White crystals quoted £39 15s. per ton, c.i.f. U.K. ports: brown £38 10s. per ton, c.i.f. U.K. ports. Spot material on offer at £42 15s. per ton, ex store, spot delivery.

MAGNESITE, GROUND CALCINED.—Quoted £8 10s. per ton, ex store, in moderate demand.

METHYLATED SPIRIT.—Industrial quality 64 O.P. now quoted 1s. 7d. per gallon, less 2½%, delivered.

POTASSIUM BICHROMATE.—4⅛d. per lb. delivered, minimum four-ton lots. Under four-ton lots ½d. per lb. extra.

POTASSIUM CARBONATE, 96/98%.—Rather scarce for immediate delivery. Quoted £25 10s. per ton, ex wharf. Spot material about £26 10s. per ton, ex store.

POTASSIUM CHLORATE, 99/100%.—Rather firmer and powdered quality now offered at £25 15s. per ton, c.i.f. U.K. port. Crystals 30s. per ton more.

POTASSIUM NITRATE.—Refined granulated quality offered £19 2s. 6d. per ton, c.i.f. U.K. ports. Spot material on offer at about £20 10s. per ton, ex store.

POTASSIUM PRUSSIATE (YELLOW).—Unchanged at about 6½d. per lb., ex store, spot delivery. Offered from the Continent at 6⅜d. per lb.

SODA CAUSTIC.—Powdered, 98/99%, £17 7s. 6d. per ton; solid, 76/77%, £14 10s. per ton; 70/72%, £13 12s. 6d. per ton, minimum four-ton lots, carriage paid on contract. Spot material 10s. per ton extra.

SODIUM ACETATE.—In good demand and spot material scarce. Quoted £20 5s. per ton, ex store.

SODIUM BICARBONATE.—Refined recrystallised £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—Quoted 3d. per lb., delivered buyers' works, minimum four-ton lots. Under four and over two-ton lots 3⅛d. per lb. Under two-ton lots 3⅜d. per lb.

SODIUM CARBONATE (SODA CRYSTALS).—£5 to £5 5s. per ton, ex quay or station. Powdered or pea quality 27s. 6d. per ton extra. Light soda ash £7 3s. 9d. per ton, ex quay, minimum four-ton lots, with various reductions for contracts.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £8 17s. 6d. per ton, ex station, minimum four-ton lots. Pea crystals on offer at £14 15s. per ton, ex station, minimum four-ton lots.

SODIUM NITRATE.—Quoted £11 per ton, ex store.

SODIUM NITRITE, 100%.—Quoted £19 10s. per ton, ex store.

SODIUM PRUSSIATE (YELLOW).—In moderate demand and price unchanged at about 4¼d. per lb., ex store. Offered for prompt shipment from the Continent at 4¼d. per lb., ex wharf.

SODIUM SULPHATE (SALTCAKE).—Prices 50s. per ton, ex works, for unground quality, 52s. 6d. per ton, delivered. Ground quality 3s. 6d. per ton extra.

SODIUM SULPHIDE.—Prices now as follows: solid, 60/62%, £9 per ton; broken, 60/62%, £10 per ton; crystals, 30/32%, £9 2s. 6d. per ton, delivered buyers' works on contract, minimum four-ton lots. Special prices for some consumers. Spot material 5s. per ton extra.

ZINC CHLORIDE.—British material, 98/100%, quoted £24 15s. per ton, f.o.b. U.K. ports; 98/100%, solid, on offer from the Continent at about £21 15s. per ton, c.i.f. U.K. ports. Powdered 20s. per ton extra.

ZINC SULPHATE.—Continental material quoted £11 15s. per ton, ex wharf.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Du Pont Interests in Chile

A SHORT time ago the du Pont interests sold their nitrate oficinas "Delamere" and "Pena Grande" to the Lautaro Nitrate Co. To assist in avoiding any misunderstanding on the part of the trade regarding the position of the du Pont Co., and the effect of the discontinuance of operations in Chile by their producing subsidiary, the du Pont Nitrate Co., it is stated that even though the du Pont Nitrate Co. has discontinued producing nitrate of soda in Chile, the activities of E. I. du Pont de Nemours and Co. as importers and distributors of nitrate of soda in the United States will continue as heretofore and not be affected by this change.

Agreement in German Vulcan Fibre Industry

AFTER exhaustive negotiations, the chief German manufacturers of vulcan fibre have arrived at an arrangement regarding manufacture and sales. The firms involved are the I. G. Farbenindustrie (manufacturing at their works at Düneberg, near Hamburg), the Vulkan-Fiber-Fabrik Martin Schmid, of Berlin, and the Internationale Vulkan-Fiber-A.-G., of Wilhelmsburg, near Hamburg. A joint sales organisation known as the Vulkanfiber-Verkaufsgesellschaft m. b. H. has been established, with a head office in Berlin. On the manufacturing side, an exchange of technical knowledge and a "rationalisation" of the works is foreshadowed.

Manchester Chemical Market

[From Our Own Correspondent.]

Manchester, April 12, 1928.

The demand for chemicals this week has been influenced to a marked extent by the holidays and it is no exaggeration to say that the market is now only just settling down. Actual business in the home trade section has been on quiet lines, but by the beginning of next week there should be a substantial improvement in this respect, whilst inquiry on export account has also been on a limited scale. On the whole, however, prices have been maintained pretty well all round and there is a continued steady undertone about the market.

Heavy Chemicals

Considering the broken week there has been a fair trade put through in the case of caustic soda, offers of which keep firm at from £13 7s. 6d. to £15 7s. 6d. per ton, according to quality. For bicarbonate of soda, also, a quietly steady demand is being met with at £10 10s. per ton for home trade consumers. Saltcake continues to attract a comparatively limited amount of attention from buyers, but prices are unchanged at £2 12s. 6d. per ton in contract lots. A quiet trade is passing in sulphide of sodium, with commercial crystals on offer at round £7 15s. per ton and 60–65 per cent. concentrated solid at about £10. The tendency of chlorate of soda is somewhat easy and only a very moderate demand for this has been reported this week; an average price to-day is about 2¾d. per lb. Offers of phosphate of soda are at £12 10s. to £12 15s. per ton, with inquiry in this section far from brisk. Alkali is a quietly steady trade with makers' offers still at £6 2s. 6d. per ton. A moderate business is being put through in bleaching powder on a contract basis of £7 per ton. Prussiate of soda is moving off in fair quantities at 4¼d. to 4½d. per lb., and a similar condition exists in the case of bichromate of soda, offers of which are at about 3¼d. per lb. With regard to nitrite of soda quotations for this keep very steady at round £19 5s. per ton. Only a quiet trade is passing in hyposulphite of soda, with the photographic quality quoted at about £16 10s. per ton and the commercial material at between £9 5s. and £9 10s.

The potash compounds, generally speaking, have kept very steady. Chlorate of potash shows little change on the week and a relatively small business is being done at about 3d. per lb. Caustic potash meets with a quietly steady demand and values are well maintained at £33 5s. per ton for prompt delivery of one to five-ton lots. There is some inquiry about for yellow prussiate of potash, offers of which are in the neighbourhood of 6½d. per lb. Bichromate of potash is in moderate request and up to 4¼d. per lb. is still being quoted for this material. Sales of carbonate of potash are on a rather quiet scale, but quotations show little change at round £25 5s. per ton. Permanganate of potash is slow, with B.P. material on offer at 5d. to 5¼d. per lb. and commercial at about 4¼d.

Arsenic is fairly steady at from £17 to £17 5s. per ton at the mines for white powdered, Cornish makes, but inquiry has been slow this week. Sulphate of copper, also, has been comparatively quiet, but values are steady at about £26 15s. per ton, f.o.b. Nitrate of lead is attracting little attention at the moment, but prices for this are held at £37 per ton. A quiet trade is passing in acetate of lead at £40 to £41 per ton for white material and about £39 for brown. There is not much stirring in acetate of lime, and brown is a shade easier at £9 10s. to £10 per ton, with grey about maintained at £16.

Acids and Tar Products

Citric and tartaric acids are moving off in limited quantities, but in both cases the firmness continues, citric now being quoted at from 1s. 11½d. to 2s. per lb., and tartaric acid at about 1s. 4¼d. per lb. Acetic acid is still moderately active and prices are steady at £37 to £38 per ton for the 80 per cent. commercial grade and £66 for the glacial. Oxalic acid is in quiet call, but quotations are steady at 3¼d. per lb.

Pitch has been slow with current offers of this material at about £3 2s. 6d. per ton. There is a moderate demand about for carbolic acid crystals at 6¼d. per lb., f.o.b., crude keeping steady at round 2s. 4d. per gallon. Creosote oil is in quiet request, but about 7¼d. per gallon is still being quoted in this section. Offers of solvent naphtha are at about 10¾d. per gallon, a moderate inquiry being reported.

London Chemical Market

Owing to the Easter holidays there has been little change in the markets and business has been slack. In view of the position a report is not issued this week as there is very little to record.

Latest Oil Prices

LONDON—April 11.—Linseed Oil, steady at barely late rates. Spot, ex mill, £30 10s.; April, £29 7s. 6d.; May-August, £30; and September-December, £31 5s. Rape Oil, quiet. Crude extracted, £41; technical refined, £43, naked, ex wharf. Cotton Oil, slow. Refined common edible, £40; Egyptian crude, £35; deodorised, £42 per ton, naked. Turpentine, quiet. American, spot, 39s. 3d.; May-June, 39s. 6d.; and July-December, 40s. per cwt.

HULL—April 11.—Linseed Oil.—Spot and April, £29 10s.; May-August, £30; September-December, £31 2s. 6d. Cotton Oil.—Bombay crude, £32 5s.; Egyptian crude, £34; edible refined, £37 10s.; technical, £36; deodorised, £39 10s. Palm Kernel Oil.—Crushed, naked, 5½ per cent., £38. Groundnut Oil.—Crushed/extracted, £41; deodorised, £45. Soya Oil.—Extracted and crushed, £33; deodorised, £36 10s. Rape Oil.—Crude/extracted, £40; refined, £42 per ton. Turpentine.—Spot, 42s. per cwt., net cash terms, ex mill.

Nitrogen Products

Export.—On account of the holiday season the market has been quiet, with prices remaining firm. Stocks in consuming countries continue to be diminished. The price remains at £10 2s. 6d. per ton f.o.b. U.K. port in single bags.

Home.—The feature of the home demand is the strength of the buying from Ireland and Scotland. Apart from this, the demand remains steady in most parts of England and Wales. The present price of £10 13s. per ton, delivered in 6 ton lots, will probably remain in force until the end of June.

Nitrate of Soda.—The demand from the United States continues strong. The price remains unchanged at 16s. 6d. to 16s. 9d. per metric quintal f.a.s. Chile. Stocks in Europe and Egypt are also diminishing, but there is little fresh inquiry for prompt shipment.

South Wales By-Products

Very little business has been done in by-products in South Wales during the week. Prices in most products are unchanged. Pitch continues to change hands round about 59s. to 63s. per ton, buying being principally confined to briquette manufacturers. Creosote has a weak market at 7¼d. to 8¼d. per gallon, f.o.r. maker's works, and heavy and solvent naphtha have little demand with no change in values. Crude tar continues easy round about 50s. per ton, f.o.r., while refined tars are unchanged. Patent fuel and coke exports have dropped in volume, chiefly because of the holidays, but prices are unchanged, patent fuel (Cardiff) commanding 21s. to 23s. per ton, ex ship, and Swansea about 20s. 3d. to 20s. 9d., ex ship. Coke, best foundry, continues to sell at from 32s. 6d. to 37s., and other sorts from 25s. to 32s. 6d. per ton. Patent fuel exports during the past four weeks amounted to 81,112 tons, while oil imports over the same period amounted to 12,568,980 gallons.

Imperial Chemical Industries Expansion in Japan

An interesting development of Imperial Chemical Industries' business in Japan was mentioned in the *Evening Standard* on Wednesday. "This," it was stated, "is the entry of the combine into the wireless business through its subsidiary, Brunner Mond and Co. (Japan), Ltd., the name of which is shortly to be changed to Imperial Chemical Industries (Japan), Ltd. An agreement has been completed under which the Japanese company will act as distributors for a large American firm of wireless manufacturers, the Alwater Kent Manufacturing Co. The sale of wireless apparatus has reached very considerable extensions in Japan during the last three years, so that the wireless side of Imperial Chemical Industries' business there is likely to increase rapidly." It will be interesting to see," concludes the writer, "whether this agreement marks the beginning of a still further widening of the combine's scope."

Company News

NITRATE RAILWAYS CO.—A final dividend of 3½ per cent. is recommended on the ordinary shares, making 5 per cent. for the year 1927.

BURMAH OIL CO.—The directors have resolved to pay, on April 30, half-yearly dividends on the 6 per cent. preference shares of £1 each, the 6 per cent. second preference shares of £10 each, and the 8 per cent. preference shares of £1 each, less amount of British income tax.

OLYMPIC PORTLAND CEMENT CO.—The net profits for the year 1927 amounted to £80,891, and £21,593 was brought forward. A final dividend of 10 per cent. is proposed, making 15 per cent. for the year; £20,000 is added to the reserve account; £20,000 to the depreciation fund and £9,000 to reserve for extension of property; leaving £23,484 to be carried forward.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

GAS WORKS PLANT.—The Municipality of Frederiksberg, one of the three municipalities comprised in Greater Copenhagen, is inviting tenders for:—(*a*) Delivery and erection of the following new apparatus and machinery, 4 waterpipe coolers, 1 exhauster and steam engine, 1 circulation regulator, 2 "Pelouses," 2 rotating ammonia washers, etc. Tenders must reach Copenhagen before April 21. (Reference A.X. 6,131.)

Forced Draught for Steam Boilers

A New Cleaning Out Extension and Baffle Bridge

A NOTABLE addition to steam boiler plant equipment, especially for smaller chemical works and similar industrial establishments, is the latest design of the well-known "Turbine" forced draught steam jet furnace, which is now combined with an extension cleaning out and baffle bridge. The subject is also important because the new arrangement enables very rapid cleaning out to be obtained, with little drop in the steam pressure, under conditions of considerable fluctuations in the demand for steam characteristic of boiling and general chemical process work. The design of the "Turbine" furnace is, of course, already well known, and consists of five or six longitudinal cast-iron trough firebars with a whole series of small firebars or elements, about 50 or 60 for the average grate length, resting in the top transversely. These elements dip into the current of steam and air so as to divert an equal amount to every part of the grate, both longitudinally and transversely, the troughs also being sloped at the bottom for the purpose, with one steam blast nozzle in each.

The new addition consists of a flat bridge or surface 3 ft. long in the form of a cast-iron trough filled with firebrick, giving a level surface with the grate, and supported at the far end by a cast-iron extension piece in the baffle bridge, which is built fairly high in the furnace tube, and is provided with channels so that the flames and hot gases can go between the incandescent brickwork as well as over the top. Further, there is included an arrangement for the supply of any desired amount of secondary air beneath this cleaning out extension piece by means of auxiliary steam nozzles, operated as desired by a lever, and a handle at the front of the boiler. On these lines a further amount of air in the form of a forced draught blast can be applied locally at the bridge to aid in the combustion of black smoke.

In cleaning out, a small portion of the fire is pushed back by means of the rake on to the flat bridge, and then the mass of ash and clinker removed as usual. Afterwards, the portion of live fire at the back is pulled forward again on to the grate, and in this way the green coal is ignited very rapidly, preventing undue excess of cold air passing and lowering of the steam pressure, especially as the ash is in a granular condition due to the cooling effect of the steam. This also protects the bars and enables them to last many years. The subject is of interest for general furnace work in the chemical industries, apart from steam boilers.

New Chemical Trade Marks

Applications for Registration

This list has been specially compiled for us from official sources by Gee and Co., Patent and Trade Mark Agents, Staple House, 51 and 52, Chancery Lane, London, W.C.2, from whom further information may be obtained, and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks, and Designs.

Opposition to the Registration of the following Trade Marks can be lodged up to May 4, 1928.

"ISTRINE."

486,793. Class 1. Enamel for coating metal, and enamel in the nature of paint. Charles Edmund Peczenik, 17, New Cavendish Street, Portland Place, London, W.1; manufacturer. December 14, 1927.

"HORMOCARDIOL."

488,489. Class 3. Chemical substances prepared for use in medicine and pharmacy. Bayer Products, Ltd., 31 to 34, Basinghall Street, London, E.C.2; merchants and manufacturers. February 14, 1928.

"RUSTECTOR."

488,824. Class 1. Paints and anti-corrosives, included in Class 1. Macknights, Ltd., Rocksavage, Chemical Works, Frodsham Bridge, Cheshire; manufacturers. February 24, 1928.

"PROPALAC."

488,327. Class 1. Enamels, stains, lacquers and varnishes. Lionel Blundell, Hillside, Prestwich Park, Manchester; chemical manufacturer. February 9, 1928.

"SCALZOL."

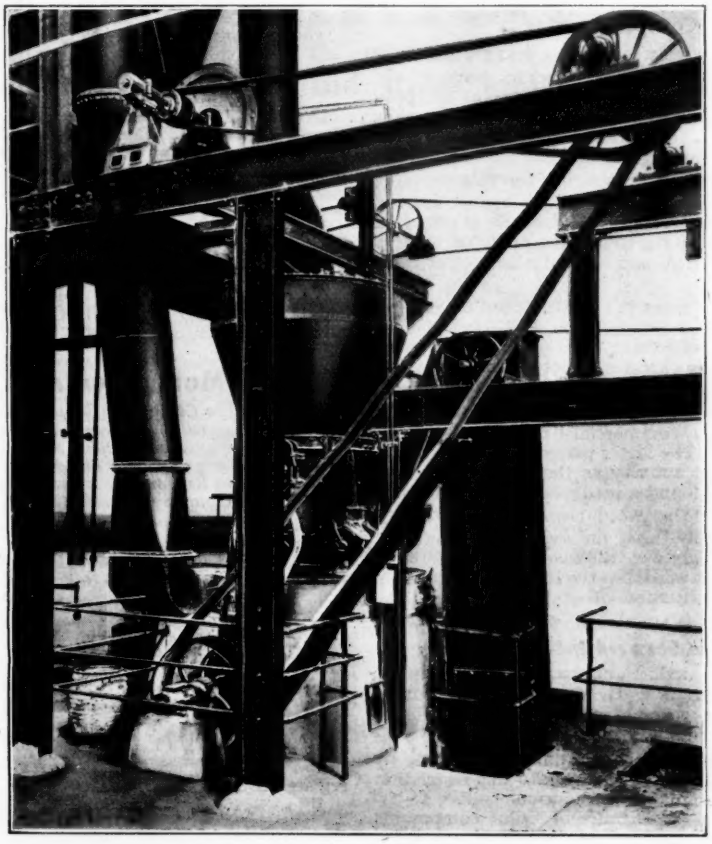
488,667. Class 1. Preparations for preventing or removing scale in steam boilers. Godfrey Woodhead and Son, Chemical Works, Kitchin Fold, Slaithwaite, Yorkshire; chemical manufacturers. February 20, 1928.

British Interest in Canadian Electrical Smelter

A MESSAGE from Canada states that a British syndicate formed recently by Lord Gainford, Sir George Courthope and others has decided to construct a big electric smelter in or near the City of Quebec for the treatment of the minerals of Gaspé and Chibougamau. The Hon. A. Turgeon, speaker of the Legislative Council of Quebec, who is president of the Canadian executive of the syndicate, stated recently that if electric power could be obtained cheaply enough at Quebec, a site in the Lake St. John region would be forwarded. The smelter would be built especially to cope with zinc and lead ores mined in the Gaspé district of Quebec, on the southern shore of the Gulf of St. Lawrence, and the minerals would be brought to Quebec by boat. Development work going on in the Gaspé peninsula gives signs of big results, and a smelter at Quebec would advance the industry to an enormous extent. Lake Chibougamau is upwards of 100 miles to the north-west of Lake St. John. The province of Quebec has already in operation two metallurgical smelters, one being that of the Noranda Mines, Ltd., at Rouyn, working on the copper ores of north-western Quebec and operating with pulverised coal. The other, built by the Aluminium Corporation of Canada, Ltd., at Arvida, Quebec, is an electric smelter operating from current transmitted from the Ile Maligne plant on the Great Discharge of the Saguenay River. The proposed third smelter comes as one of the results of the visit to Canada, early last summer, of gentlemen representing an important group of British capitalists.

Chemical Society Arrangements

THE meetings of the Chemical Society of London arranged for May 3 and 17 and June 7 and 21 will, as an experiment, be held at 5.30 p.m. instead of at 8 p.m. The president, Professor J. F. Thorpe, will, on behalf of the Society, present an address of congratulation to the Sociedad Española de Fisica y Quimica on the occasion of its silver jubilee celebrations in Madrid on April 9 to 15. The Arrhenius Memorial Lecture will be delivered by Sir James Walker, F.R.S., at the Royal Institution, London, on May 10 at 5.30 p.m., admission being by ticket only. Applications for grants from the Research Fund must be received by June 1.



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Seaweed as a Commercial Asset.

(From a Correspondent.)

The simplest use found for seaweed is as a manure for those land areas sufficiently close to the shore to warrant the expense of cartage. In England it is not unusual to apply fifteen tons to the acre. In the Channel Islands forty tons are used in September in anticipation of the potato crop at the turn of the year. In some areas the seaweed is ploughed into the soil. Analyses indicate its value for this purpose. Fresh seaweed contains 12 to 25 per cent. of organic matter, 0·78 to 1·83 per cent. of potash, and 2 to 4 per cent. of nitrogen. Dried seaweed may contain 64 to 80 per cent. of organic matter, 2·5 to 10·5 per cent. of potash, and 1 to 1·5 per cent. of nitrogen.

The chief modern development in the utilisation of seaweed is to be found in the United States. The U.S. Government Experimental Kelp Products Plant was set up during the war in order to obtain home supplies of potash salts. It was realised that in order to provide a cheap supply the potash needed to be a by-product, and experiments proved the possibility of obtaining, on a commercial basis, iodine, potash, and decolorising carbons. The latter particularly were found to have as high a grade of activity as the best decolorising agents on the market, and found a ready sale under the trade name of "Kelpchar." The seaweed harvesters fitted with cutting knives at the prow have an available harvest of 400,000 tons a year. Not only were the three products already mentioned obtained from seaweed, but the Hercules Powder Co. set up a plant for the extraction of acetone, creosote and alcohol.

The Japanese Seaweed Industry

Japan has a flourishing iodine industry built up on the use of seaweed, and takes rank as the second world producer after Chile, which produces much more than all the other countries of the world combined. As a product of the saltpetre resources of that country its output is restricted by Chilean manufacturers. It is merely owing to this restriction that any scope is left for kelp-iodine producers.

The growing belief in the importance of iodine compounds as a constituent of diet, the consumption of which is of great physical importance to the human body makes any monopoly undesirable. National interests may therefore demand the home production of iodine. Experiments have recently been made on the Continent, with successful results, to test the value of seaweed as a horse fodder, and it is replacing oats in this connection. The results of the researches into the properties of seaweed carried out by Stanford in the last half of the last century have been regrettably neglected. A Scottish report on home industries states that a cellulose product has been obtained from seaweed which can replace cotton wool and lint, and is available as a stuffing and a medium for packing.

Chemical Engineering Group at Birmingham

To make the meeting as successful as possible special travel arrangements have been made for members attending the joint meeting of the Chemical Engineering Group at Birmingham on April 20. Railway arrangements have been made providing for twelve or more members to travel at a fare of 18s. 9d. for the double journey. The train will leave Euston at 11.30 a.m. arriving at Birmingham at 1.35 p.m. Lunch will be served on the train. The rendezvous at Birmingham is outside Council House, Edmund Street. Members will then be taken by bus to the heat treatment shops of the Birmingham Gas Department, returning afterwards to visit the physical and mechanical testing laboratories in Margaret Street and thence to the demonstration rooms of the Industrial Research Laboratories, in Edmund Street. At six o'clock in the evening an informal dinner will be held at the Engineers' Club, Waterloo Street, after which Dr. C. M. Walter will read his paper on "The Heat Treatment of Ferrous Metals."

Tariff Changes

Roumania.—A duty of 6,000 lei per wagon is leviable on caustic soda exported from the country.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

MILLS (FRED W.) AND CO., Ellenbrook, Booths Town, near Manchester, chemical dealers. (C.C., 14/4/28.) £20 8s. 9d. February 25.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case, the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]*

BOYES (W. H.) (1920), LTD., Radcliffe, dyers and bleachers etc. (M., 14/4/28.) Registered March 19, £2,500 mortgage to Rt. Hon. C. W. A. Montagu, 44, Grosvenor Square, and another; charged on properties at Radcliffe, etc. *Nil. February 21, 1928.

Satisfaction

DIXON'S WHITE, LTD., London, E., paint manufacturers. (M.S., 14/4/28.) Satisfaction registered March 26, £6,000 registered October 26, 1922.

Bill of Sale

HALLEY, James, 17, Kenilworth Court, Lower Richmond Road, Putney, chemicals, oils and fats agent. (B.S., 14/4/28.) Dated March 26th, filed March 27th. £200.

New Companies Registered

"ADMIRAL" (DYES AND OTHER PRODUCTS), LTD., Coventry House, South Place, London, E.C.2. Registered April 7. Nom. capital, £15,000 in 10,000 8 per cent. cumulative preference shares of £1 each and 100,000 ordinary shares of 1s. each. To carry on the business of chemists, manufacturers of and dealers in preparations for the adaptation of dyes by certain processes for certain purposes, leather, linoleum and furniture polishes, cleansing liquids, etc., and to adopt an agreement with G. Borgers, A. E. W. Moltmaker, K. Meijer and P. Lewis. Directors: P. Lewis, J. H. Lewis, G. Borgers, A. E. W. Moltmaker, M. O. Lewis.

THAMES MILLING CO., LTD. Registered April 3. Nom. capital, £100,000 in 50,000 6 per cent cumulative preference and 50,000 ordinary shares of £1 each. Seed crushers and manufacturers of linseed, cotton and other cakes, oil extractors by crushing, chemical or any other processes, cake and oil manufacturers, etc. A subscriber: R. P. Slade, 3, Hanover Terrace, London, W.11.

An I. G.-Montecatini Agreement

Reports from Berlin indicate that the I. G. Farbenindustrie has reached an agreement with the Societa Montecatini (of Italy) whereby the latter will obtain the benefit of German experience in the production of synthetic fertiliser materials. It is further stated in a message from Rome that the Societa Montecatini has recently commenced the manufacture of ammonium sulphate-nitrate and calcium nitrate, two I. G. specialities, which would tend to confirm the former report. It is stated that the I. G.-Montecatini negotiations were concluded without any financial acquisition on the part of the Germans in the Italian company.